ANNUAL REPORT

PROGRAM YEAR 2017

Hawai'i Energy

leidos

ANNUAL REPORT

Program Year 2017

July 1, 2017 – June 30, 2018

Submitted to the Hawai‘i Public Utilities Commission by:

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Hawai‘i 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 a very strong Program Year 2017, achieving the second highest level of kilowatt hour (kWh) savings, second only to the first year in our current 3 year cycle. The strong past two program years placed Hawai'i at 6th nationally on the American Council for an Energy-Efficient Economy's scorecard for 2017 electricity program savings.[1] 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, 2017 through June 30, 2018, the Hawai'i Energy efficiency programs will deliver 137 million kWh in first year savings and 1.80 billion kWh in lifetime energy savings. Energy efficiency continues to allow Hawai'i to reach its 100% clean energy goals faster and cheaper. This is once again evidenced by the Hawai'i Energy total program cost of 1.28¢ per kWh (total program costs / total lifetime kWh benefit). This, in turn, will save an estimated equivalent of 3.0 million barrels of oil and 1.8 million tons of greenhouse gas emissions.

With Hawai'i already being one of the most expensive places in the country to live, reducing monthly energy costs is important for our families and businesses. According to Aloha United Way's ALICE® (Asset Limited, Income Constrained, Employed) report released last year, 165,013 households (37%) are ALICE households living in financial hardship while another 47,066 households (11%) live below the poverty level. Our ALICE population represents people who have one or multiple jobs but struggle to afford basic necessities to remain stable and self-sufficient. Reducing energy costs are a necessity, and not a luxury for these families. I am proud to share that the savings realized through participation in the Hawai'i Energy programs will yield approximately $443 million over the life of installed measures.

One way to ensure equity and help our island families is through our aggressive engagement of the *Energy Smart 4 Homes* direct install program. In partnership with the City and County of Honolulu, we launched an effort at over 1,000 city-owned units. Through the program, professionals installed energy-efficient showerheads and faucets, along with ENERGY STAR® LED bulbs at no cost that will allow residents to save up to $160 a year. "Reaching Hawai'i's mandate of 100 percent renewable energy by 2045 is going to take all of us working together, and each residential unit that's retrofitted with energy-saving LED lighting takes us closer to our goal," said Mayor Kirk Caldwell. "Beginning with our project at Marin Tower, our close partnership with Hawai'i Energy will help O'ahu taxpayers realize $120,000 in savings each year."

As the backbone of our economy, Hawai'i Energy helped over 750 underserved small businesses with our direct install lighting program. This will result in the customers saving over 123,083 MWh over the life of the lighting system that will generate over $28.0 M in lifetime cost savings for these businesses. One beneficiary of the program was the Honolulu Habitat for Humanity's ReStore facility. Utilizing our network of Clean Energy Allies, Hawai'i Energy not only provided a significantly discounted retrofit, but provided a contractor who went above and beyond and helped ReStore dispose of old, no-longer-usable CFL bulbs for which disposal would have cost $7,000. The success of pairing a contractor to do a custom offering with a local nonprofit inspired Hawai'i Energy launch a new nonprofit incentive program in PY18.

It was another very strong year for the Hawai'i Energy program, thanks to all of the families and businesses in Hawai'i who made smart energy choices to save energy, save money, and pursue a 100% clean energy future. Without you and the over 5,000 professionals who are employed in energy efficiency in this State and are on the front lines designing, installing, or carrying energy efficient equipment, none of this would be possible. Mahalo!

Respectfully submitted,
Brian Kealoha

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[1] ACEEE 2018 State Energy Efficiency Scorecard, page 22, Table 6

BACKGROUND

Program Origins

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

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

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

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 PY17 building on the momentum of the previous program year and continuing to grow our impact with customers and clean energy allies. 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 153 gigawatt hours. This equates to over $37 million in first year energy savings and nearly $488 million over the life of the measures installed in PY17.

PY17 was the second year of the three-year contract period. This year was characterized by continued program enhancements, driving deeper energy savings with customers and extensive market transformation work in both the residential and commercial portfolios. In PY16, Hawai'i Energy redesigned a number of its Market Transformation efforts in order to best align with the "Hawai'i Energy 2.0" launch. This refocusing of efforts yielded significant results in PY17, with the Market Transformation programs surpassing all targets for participant engagement.

The State of Hawai'i has aggressive clean energy goals and utility action plans[2] for accelerating the use of demand-side resources, renewable energy, storage and the electrification of transportation. Because these goals have significant implications for the evolution of the traditional energy efficiency programs, Hawai'i Energy has actively engaged with industry stakeholders to discuss and plan for critical program updates that will best serve customers and the grid within our evolving energy ecosystem. Along with multiple individual meetings, we hosted two significant events in PY17 that proved foundational in shaping this dialogue.

On February 14, 2018, Hawai'i Energy hosted its first interactive stakeholder meeting to inform program design and PY18 planning efforts. Facilitated by the Elemental Excelerator, attendees included representatives from the Department of Commerce and Consumer Affairs (Consumer Advocacy Division), Aloha United Way, Maui Economic Development Board, Hawai'i Green Growth, O'ahu Economic Development Board, the Hawai'i Public Utilities Commission, Hawaiian Electric Company, Hawai'i Natural Energy Institute, Blue Planet Foundation, Ulupono Initiative, Kamehameha Schools, Chamber of Commerce Small Business Program, Environmental Protection Agency, the City and County of Honolulu, Hawai'i Center for Advanced Transportation Technologies and the Distributed Energy Resource Council. Through these efforts, we were able to narrow down and commit to testing several key initiatives in PY18 to drive energy efficiency and economic growth, improve resiliency, and enable a 100% clean energy future.

The second significant event was our inaugural Innovation Symposium, which took place on April 26, 2018 at the Sheraton Waikīkī. Attended by approximately 200 people with more than 20 exhibitors, the full-day conference featured a number of energy-related seminars and a diverse group of accomplished speakers. It was headlined by Elemental Excelerator's Dawn Lippert and the Hawai'i Natural Energy Institute's Jennifer Potter, who shared their insights on innovation in Hawai'i's evolving energy ecosystem. The event was designed to provide Hawai'i businesses of all sizes with vital tools necessary to evaluate their energy usage and increase their profits by focusing on connecting customers, clean energy allies and other energy stakeholders.

Hawai'i Energy hosted an idea harvesting session to gather feedback and suggestions on what would make the programs more effective, where there are challenges to participating, and how to improve overall awareness of programs. This session proved invaluable in capturing the voice of our customers and Clean Energy Allies to inform future program design. Feedback covered short- and long-term planning, as well as tactical and strategic input. We found that

[2] https://www.hawaiianelectric.com/Documents/about_us/our_vision/psip_executive_summary_20161223.pdf

a number of comments shared echoed input provided during the stakeholder meeting, including strategic integration of energy efficiency with the electrification of transportation and the need for additional data and monitoring for integrated demand side management.

Business Program Highlights

Hawai'i Energy's Business program achieved savings of 79,700,182 kWh (first year), 1,134,730,129 lifetime kWh and 9,514 kW with $11,228,879 in incentives. This performance was very similar to PY16, though achieved with about 14.4% less incentive dollars. The business programs accounted for 58% of Hawai'i Energy's total first year energy savings and 46% of the Program's total demand savings with 59% of the Program's incentives.

Hawai'i Energy's midstream program stabilized in growth in PY17, but still was one of our most cost effective delivery paths for energy efficient equipment. In PY17 this program generated over 27 million kWh in program level savings and over 2,000 kW in program level demand savings. A total of 22 lighting distributors participated in the program and advanced over $1.4 million in Hawai'i Energy incentives for energy-efficient lighting products.

Additionally, Hawai'i Energy's Small Business Direct Install Lighting (SBDIL) program reached over 760 small businesses in PY17 and generated over $28 million in lifetime bill savings for these customers. The program also made improvements to the functionally of the AMPLIFY lighting audit tool and database, launching a new feature, called RESPONSIVE, that allows contractors to use the same features as AMPLIFY on their smart phones and tablets. This mobility allows contractors to be more efficient and accurate in the field, and further eases the application process.

Incentives from the Business Energy Services & Maintenance budget supported the Continuous Energy Improvement (CEI) program, providing $7,000 in rebates to support the installation of chiller loop metering & monitoring systems at two businesses. Energy engineers provided monthly utility bill analyses with regression models unique to each business, accounting for variables such as hotel occupancy. Through CEI, the Program engaged business decision makers regarding capital improvement opportunities, and also involved managers in identifying ways the staff could reduce energy use (and therefore business operating expense) through everyday actions. After one of our meetings, one of the managers informed us that he had unplugged their secondary, industrial-sized coffee pot, which was typically kept on all day for guests, and saw no negative impact by doing so – only energy savings.

Residential Program Highlights

In PY17, Hawai'i Energy's residential programs achieved 56,900,070 first year kWh, 631,855,045 lifetime kWh, and 11,213 kW in demand with $7,872,809 in incentives. The residential programs accounted for 42% of Hawai'i Energy's total first year energy savings and 54% of the Program's total demand savings with 41% of the Program's incentives.

The success of Hawai'i Energy's residential programs in PY17 are a direct result of the continuing effort to enhance and streamline existing offerings while being responsive to the marketplace. New measures and innovative programs were introduced via a focus on customer segmentation, leveraging program and customer data, and conforming program offerings to the perspective of the customer and Clean Energy Allies.

Following the launch of the A/C Tune-up program in PY16, the Program reviewed the offering with our participating contractors to determine how to streamline and improve the program further in PY17. Although large numbers of contractors had participated during the PY16 program year, the Program focused efforts on expanding our reach and engaging more of the HVAC contractor market. By the end of PY17, the Program saw a five-fold increase in participating AC program contractors.

High efficiency clothes washers and dryers, as well as heat pumps, were added to the existing midstream delivery channel, which launched in PY16 with the addition of consumer electronics (TVs and sound bars). Hawai'i Energy continues to offer midstream incentives to encourage retailers to stock and sell only

the most efficient models on their floors. Moving rebates midstream streamlines the rebate process and helps reduce supply barriers in a market restricted by distributer and retailer stocking decisions.

In PY17, the Program saw an increase of ENERGY STAR® televisions in the program from 6,000 in PY16 to over 9,000 in PY17, as well as an increase from 1,000 ENERGY STAR® home audio systems in PY16 to over 1,600 units in PY17 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. Combined with high efficiency washers and dryers, these ENERGY STAR® products added up to a savings of over 940,000 first year kWh over baseline models.

New in PY17, smart thermostats were offered for energy use reductions with automatic scheduling features, learning algorithms and two-way communications. The two-way communication features also present future possibilities for peak demand savings through participation in demand response programs as a targeted Integrated Demand-Side Management (IDSM) measure.

The Peer Group Comparison Report program reached over 230,000 customers, reaching all eligible customers in Hawai'i, Honolulu, and Maui Counties accounting for nearly 14,000,000 kWh in first year energy savings. The program distributed personalized home energy reports (HERs), giving residents insight into their electricity consumption and how it compares to that of similar households. The report continued to be one of Hawai'i Energy's 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.

Hawai'i Energy's hard-to-reach programs address the needs of underserved customer segments and communities that require additional resources and easier access to traditional program offerings. The *Energy Smart 4 Homes* (ES4H) program provides multifamily customers direct access to no-cost energy efficiency solutions, such as high-efficiency lighting and water measures and energy management devices. In PY17, ES4H expanded its reach and teamed up with a channel partner to service properties in both the public and private sectors, punctuated by installations at the Hawai'i Public Housing Authority, City and County of Honolulu Department of Facility Maintenance, Department of Hawaiian Homelands, local property management companies, and single-owner walk-up properties. ES4H reached over 5,900 multifamily households, saving customers over 1,800,000 kWh on their annual energy bills in the process.

Specific projects with partners were created and conducted to address a specified community need for direct intervention in the supply chain for high efficiency appliances. In partnership with Sustainable Moloka'i, Council for Native Hawaiian Advancement and the Hawai'i Sober Living and Recovery Center, Hawai'i Energy delivered high-efficiency appliances, water heating, and HVAC to residents who would be otherwise unable to realize these energy savings.

Transformational Program Highlights

In PY17, the Transformational program provided diverse educational outreach in encouraging energy efficient choices by Hawai'i residents and businesses, finding innovative and engaging ways to convey energy efficiency information and help make informed decisions about energy consumption. The program targeted 2,100 behavior modification participant hours during the program year and achieved a total of 4,549 participant hours, with a strong emphasis on hard-to-reach and low-income populations. Almost 80 hard-to-reach workshops were conducted, designed to guide the participant in finding straightforward ways to lower their monthly energy bills. They were facilitated by local instructors with strong community relationships and delivered to communities from Mā'ili to Moanalua to Lāna'i and Moloka'i.

The Program's professional development and technical training 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. This year, the Program was able to surpass its participant hour goal of 8,370 hours, tallying 10,740 hours across activity categories including technical seminars and workshops, professional certification courses, internships and advanced sales trainings.

Hawai'i Energy supported the inaugural Ka Hei Teaching Energy Professional Development educator workshops (provided by Engie) which specifically targeted K-12 public school teachers. The Teaching Energy curriculum was formally approved by the Hawai'i Department of Education (DOE) in 2017 and provides public school teachers with "Professional Development Experiences that Educate, Empower, Excel," commonly referred to as PDE3 credits, that satisfy continuing education requirements. This partnership yielded over 1000 participant hours of teacher training in energy efficiency curricula.

This program year, following adoption by the State of Hawai'i last legislative session, Hawai'i Energy and the State Energy Office encouraged adoption of the 2015 version of the International Energy Conservation Code at the county level and sponsored free code training sessions statewide. The trainings helped several hundred design and construction professionals, government officials and members of the public to understand the new code and how to successfully implement it. It is estimated that the new code will save 4.7 million megawatt-hours and over $1 billion in homes and businesses over the next twenty years.

The Program also expanded on its pilot Continuous Energy Improvement (CEI) efforts, which created a comprehensive program for larger institutions to achieve and verify ongoing energy improvements through systemic and deep-rooted changes in operations, maintenance and behavior. Hawai'i Energy staff led trainings and workshops with two institutional members of the inaugural cohort to kick off and implement customized CEI programs.

Program Marketing and Branding

A new brand campaign was launched this year to refresh and solidify Hawai'i Energy's identity and new "smart energy choices" messaging amongst consumers. The campaign included:

- A multi-channel advertising buy consisting of 30 and 15-second commercial spots airing on all major local TV news networks, Oceanic Cable and in 86 movie theater screens across Hawai'i, Honolulu and Maui counties; on-air segments on local lifestyle show Living808 and out-of-home billboard-style displays at Ward Entertainment Center, Ala Moana Shopping Center and Pearlridge Center.
- A community education and awareness event hosted by Hawai'i Energy in downtown Honolulu during Energy Action Month.
- The launch of Hawai'i Energy's new mascot, Pluggy.

In conjunction with the brand campaign, the Program completed an extensive redesign of the Hawai'i Energy website featuring new graphics, improved navigation and a new Clean Energy Ally portal, created to automate Hawai'i Energy's online contractor directory and onboarding process.

The Program also expanded its marketing & communications team to include a junior-level outreach coordinator to support and increased scale and quality of Program-hosted events, including the Innovation Symposium (as described above). Notably in PY17, Hawai'i Energy proudly earned recognition as one of Hawai'i's *Best Places To Work®* as published by Hawai'i Business Magazine.

Next Steps

Energy efficiency continues to be the cheapest resource in the clean energy portfolio. Our efforts will continue to be focused on executing the near-term PY18 Annual Plan, while continuously reviewing long-term directions in preparation for the PY19-21 program cycle, and taking into consideration feedback expressed by stakeholders through docket filings, Technical Advisory Group (TAG) and Technical Working Group (TWG) meetings, and other public forums.

We continue to work closely with the utilities to grow our collaborative efforts and integrate our planning processes. As Integrated Demand-Side Management efforts evolve to provide more grid resources, continued collaboration and coordination will be necessary to ensure efforts are not duplicated and ratepayer funds are maximized. Valuation of energy efficiency to the grid, from a time and locational perspective, also continues to be a key focus discussion area in our collaboration efforts.

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

Program Achievements

- The Program invested a total of $28,730,989.68 (**Table 16**) to deliver 2,251,298,935 kWh (system-level, **Table A1**) over the measure lives resulting in a cost per kWh of $0.0128. The Total Program Levelized Cost of Saved Energy (CSE) in PY17 was $0.0214/kWh, as calculated in **Table 1** below.
- Delivered $19,101,689 in incentives (**Table 16**) driving customer bill savings of $37,413,595 annually and over $488,173,566 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 136,600,252 kWh (**Table 17**).

Table 1
Levelized Cost of Saved Energy

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

			w/o Transformation	Total Program
Discount Rate	A		6%	6%
Estimated Program Savings Life	B		13.0	13.0
Total Program Budget Less Direct Install Programs	C*		$27,762,413	$29,701,822
Annual kWh Saved at Customer Level	D		153,687,381	153,687,381
	A*(1+A)^B		0.128	0.128
	(1+A)^B-1	÷	1.133	1.133
$Capital\ Recovery\ Factor = [A*(1+A)^{\wedge B}]/[(1+A)^{\wedge B}-1]$	Capital Recovery Factor		0.113	0.113
	C		$29,762,413	$29,701,822
$Levelized\ CSE = \frac{C\ x\ (Capital\ Recovery\ Factor)}{D}$	Capital Recovery Factor	x	0.113	0.113
	D	÷	153,687,381	153,687,381
	Levelized CSE		**$ 0.0205**	**$0.0219**

Transformational Costs	***Cost****
Total Program PY17 Expenditures	$ 29,701,822
RTRAN incentives	$ 919,556
BTRAN incentives	$ 1,019,853
	$27,762,413

*Total Program Budget = Contractor Costs plus Performance Award Claim.

Table 2 Customer Energy Cost Savings by Island									
First-Year Energy Cost Savings									
Island	**R**	**G**	**J**	**P**	**DS**	**F**	**Other**	**Total**	**kWh - 1st Year**
Oʻahu	$11,059,602	$1,192,071	$8,631,059	$3,312,079	$967,035	$1,296,538	$1,638	$26,460,021	115,416,718
Hawaiʻi Island	$3,275,831	$459,505	$1,423,439	$323,553	$0	$146,459	$0	$5,628,786	18,669,260
Maui	$2,467,447	$238,200	$1,674,113	$757,510	$0	$0	$0	$5,137,270	19,036,051
Lānaʻi	$14,233	$0	$7,431	$0	$0	$0	$0	$21,664	62,464
Molokaʻi	$148,836	$245	$16,773	$0	$0	$0	$0	$165,854	502,889
Total	**$16,965,948**	**$1,890,021**	**$11,752,814**	**$4,393,142**	**$967,035**	**$1,442,997**	**$1,638**	**$37,413,595**	**153,687,381**
Customer Lifetime Energy Cost Savings									
Island	**R**	**G**	**J**	**P**	**DS**	**F**	**Other**	**Total**	**kWh - Lifetime**
Oʻahu	$127,374,265	$16,468,621	$121,816,103	$49,900,748	$15,088,667	$11,727,101	$24,576	$342,400,081	1,519,925,777
Hawaiʻi Island	$39,019,128	$6,848,851	$21,512,907	$4,534,059	$0	$1,464,593	$0	$73,379,538	244,624,621
Maui	$30,149,516	$3,459,353	$24,675,158	$11,860,820	$0	$0	$0	$70,144,848	261,443,056
Lānaʻi	$31,331	$0	$110,797	$0	$0	$0	$0	$142,128	404,834
Molokaʻi	$1,851,704	$3,676	$251,591	$0	$0	$0	$0	$2,106,971	6,392,026
Total	**$198,425,944**	**$26,780,502**	**$168,366,556**	**$66,295,627**	**$15,088,667**	**$13,191,695**	**$24,576**	**$488,173,566**	**2,032,790,314**

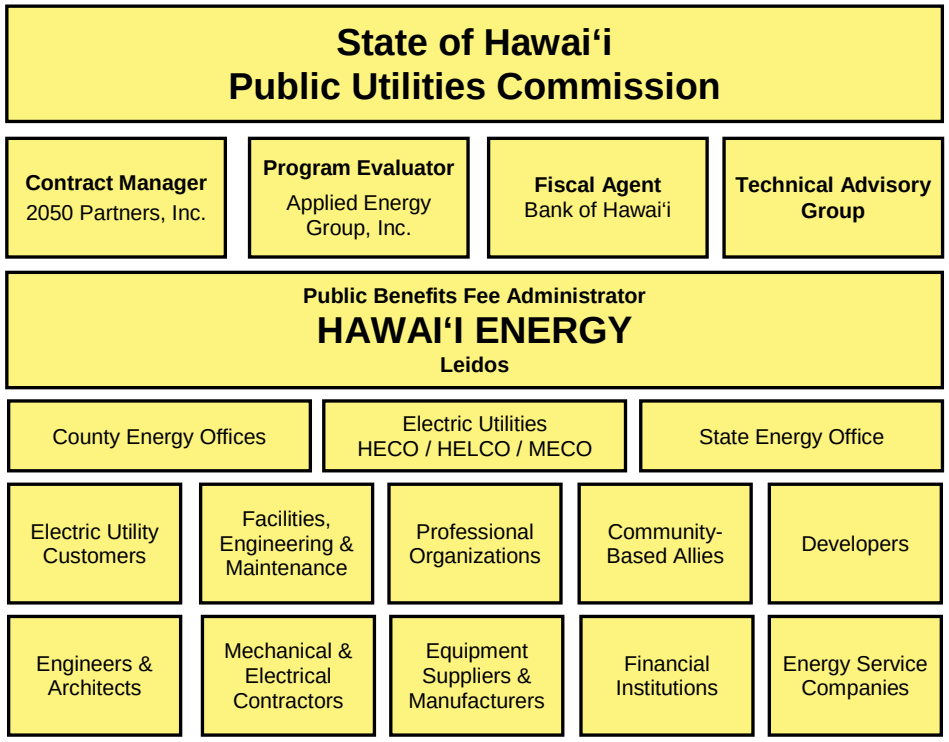
Table 3 Effective Average Utility Rate for Participants* ($/kWh)							
Island	**R**	**G**	**J**	**P**	**DS**	**F**	**Other**
Oʻahu	$0.26620	$0.25756	$0.21103	$0.18513	$0.17557	$0.26266	$0.22636
Hawaiʻi Island	$0.31109	$0.35237	$0.27910	$0.24354	$0.00000	$0.36043	$0.30931
Maui	$0.28389	$0.30488	$0.26320	$0.23655	$0.00000	$0.28773	$0.27525
Lānaʻi	$0.34355	$0.37613	$0.35327	$0.32955	$0.00000	$0.36762	$0.35402
Molokaʻi	$0.33079	$0.39915	$0.32051	$0.24620	$0.00000	$0.34943	$0.32921

*Average per kWh customer electric cost based on average utility energy costs by rate & island for Program Year 2017.

Oversight and Support

During PY17, 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 (Applied Energy Group, Inc.), 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 provided social media messaging, video services, and code compliance and advancement support.
- **FirstFuel Software, Inc**. – Provided data analytics to accelerate and reinforce commercial customer engagement by providing personalized and actionable data.
- **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.
- **Kevala+** – Provided development services for geographic information systems (GIS)-based energy efficiency and communication tool for locational analysis.
- **Kupu** – Provided energy efficiency intern 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
- **Pacific Rim Concepts, LLC** – Provided event planning and logistical support for the Program's inaugural Innovation Symposium.
- **Revacomm** – Provided software development services in support of Clean Energy Ally (CEA) system redesign.
- **Sustainable Moloka'i** – Provided administrative and home energy audit support for Hui-up on Moloka'i.
- **Vermont Energy Investment Corporation** – Provided support for Business and Residential 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 Studios** – Provided branding, website re-design, and media buy 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 to set measurable 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 PY17 are:

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

Table 4 expands on the PY17 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 PY17.

Table 4
Performance Indicators

Milestone amounts for performance indicators with multiple will be subdivided equally for award purposes.

Performance Indicators	*Performance Goals*		*Actual*	*Performance Metrics*	*Performance Award*			*Actual*	*Actual*
Resource Acquisition					**Fraction of Award** 70%	**Award Milestone** 75%	**Target Award** $682,731		
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	97,608,653	130,144,871	136,600,252	kWh	**15%**	**$109,725**	**$146,300**	**105%**	**$146,300**
• Peak Demand Reduction	16,230	21,640	20,726	kW	**15%**	**$109,725**	**$146,300**	**96%**	**$140,121**
• Total Resource Benefit	$245,590,310	$327,453,747	$333,848,273	$	**40%**	**$292,599**	**$390,132**	**102%**	**$390,132**
					70%	**$512,048**	**$682,731**		**$676,553**

Performance Indicators	*Performance Goals*		*Actual*	*Performance Metrics*	*Performance Award*			*Actual*	*Actual*
Customer Equity					**Fraction of Award** 17%	**Award Milestone** 75%	**Target Award** $165,806.10		
KEY FOCUS AREAS	***Milestone***	***Target***	***Results***	**Metrics**	***Award Breakout***	***Milestone Award Breakout***	***Target Award Breakout***		
Economically Disadvantaged	**75%**	**100%**							
• Small Business Direct Install	469	625	769	Customers served					
	5,175,000	6,900,000	8,791,690	kWh	**7%**	**$51,205**	**$68,273**	**100%**	**$68,273**
• Multifamily Direct Install	3,225	4,300	5,964	Customers served					
	975,000	1,300,000	1,812,598	kWh					
Island Equity									
• County of Hawai'i	NA	13%	13.4%	Target spend must be met in				**99%**	
• County of Maui	NA	13%	14.8%	Hawai'i & Maui Counties	**10%**	**NA**	**$97,533**	**110%**	**$97,533**
• City & County of Honolulu	NA	74%	71.8%	for Milestone and Target Award				**98%**	
Market Transformation					**Fraction of Award** 10%	**Award Milestone** NA	**Target Award** $97,533		
KEY FOCUS AREAS	***Milestone***	***Target***	***Results***	**Metrics**	***Award Breakout***	***Milestone Award Breakout***	***Target Award Breakout***		
Behavior Modification		**100%**							
• Workshops and Presentations	NA	2,100	4,523	Number of participant-hours of Training					
• Gamification Campaigns and Competitions	NA	200	3535	Number of participants	**4%**	**NA**	**$39,013**	**100%**	**$39,013**
• Social Media and Mobile Messaging	NA	3,250	4,328	Digital Engagement (followers/subscriptions)					
• Transformational Videos	NA	3	3	Number of videos produced					
Professional Development & Technical Training		**100%**							
• Clean Energy Ally Support	NA								
• Targeted Ally Training Opportunities	NA								
• Targeted Participant Training Opportunities	NA	8,370	10,741	Number of participant-hours of Training	**4%**	**NA**	**$39,013**	**100%**	**$39,013**
• Educator Training and Grants.	NA								
• Energy Industry Workforce Development	NA								
Energy in Decision Making		**100%**							
• Strategic Energy Management (SEM)	NA	2	2	Cohort participants	**1%**	**NA**	**$9,753**	**100%**	**$9,753**
Codes and Standards		**100%**							
• Code Adoption - County Level	NA	9	10	Advocacy Events					
• Code-Related Training & Compliance	NA	70	976.5	Number of participant-hours of training	**1%**	**NA**	**$9,753**	**100%**	**$9,753**
• Leading Edge Technologies and Strategies	NA	4/1	4/1	Stakeholder Meetings / Report					
Clean Energy Collaboration									
• iDSM pilot project	NA	1	1	Number of pilot projects	**0%**	**NA**	**$0**	**100%**	**$0**
Customer Satisfaction					**Fraction of Award** **3%**	**Award Milestone** **NA**	**Target Award** **$29,260**		
KEY FOCUS AREA	***Milestone***	***Target***	***Results***	**Metrics**	***Award Breakout***	***Milestone Award Breakout***	***Target Award Breakout***		
Customer Satisfaction		**100%**							
• Application Processing Customer Experience	NA	> 8.5	>9.0	Overall customer satisfaction score	**3%**	**NA**	**$29,260**	**100%**	**$29,260**
Customer Equity, Market Transformation and Customer Satisfaction Performance Award					**30%**	**$51,205**	**$292,599**		
TOTAL PERFORMANCE AWARD:					**100%**	**$563,253**	**$975,330**		**$969,151**

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

Target: 130,144,871 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 136,600,252 kWh currently equates to 1,370,433 MMBTUs or avoided use of 224,699 BBLs of liquid fossil fuels in Hawai'i; see **Table 5**.

Table 5
Estimation of Potential Fossil Fuel Avoidance

Potential Barrels (BBLs) of Fossil Fuels Avoided				
Annual Program Level Energy Savings Achievement		136,600,252	kWh/Yr.	
Average Program Attribution to System Level Impact	÷	80.3%		
System Level Gross Generation Energy Impact		**170,211,962**	kWh/Yr.	
Electrical Generation Source Distribution				
Renewable Energy Generated (2017 RPS Report)		2,328,394,000	kWh/Yr.	
Less avg. 4.7% T&D Losses (HEI 10K 2017)	x	95.3%		
Est. of Renewable Energy Sold		2,218,959,482	kWh/Yr.	25.5%
Est. Fossil-Fueled Energy Sold	+	6,471,473,518	kWh/Yr.	74.5%
Total Energy Sold (2017 RPS Report)		8,690,433,000	kWh/Yr.	
Customer-Sited - Grid Connected (2017 RPS Report)		862,638,000	kWh/Yr.	9.9%
System Level Gross Generation Energy Impact		170,211,962	kWh/Yr.	
% System Average Fossil-Fuel Generation	x	74.5%		
Reduction Target Impact in Fossil Fuel-Generation		126,751,130	kWh	
Energy Avoided into Generators				
Fossil-Fuel Energy Generated		126,751,130	kWh	
Avg. System Generating Heat Rate (HEI 10K 2017)	x	10,812	BTU/kWh	
Energy Required for Fossil-Fueled Electricity Production		1,370,433,219,539	BTU/Yr.	
Generation Liquid Fossil Fuel Mix				
Energy in BBL of Low Sulfur Fuel Oil (est.)		6,200,000	BTU/BBL	78.0%
Energy in BBL of #2 Fuel Oil (Diesel) (est.)		5,860,000	BTU/BBL	17.0%
Energy in BBL of Naphtha (5% HEI 10K 2017)		5,335,500	BTU/BBL	5.0%
Average System BTU/BBL		6,098,975	BTU/BBL	100.0%
Energy Required for Fossil-Fueled Electricity Production		1,370,433,219,539	BTU/Yr.	
Average System BTU/BBL	÷	6,098,975	BTU/BBL	
Number of Barrels of Fossil-Fuel Avoided		224,699	BBLs/Yr.	
Number of Barrels of Fossil-Fuel Avoided		224,699	BBLs/Yr.	
Estimated Cost per BBL for Fossil Fuels	x	$ 68	per BBL	
Potential Fossil Fuel Cost Savings to State		$ 15,279,528	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 27,000 passenger vehicles from the roads. The fossil fuel reduction was the equivalent of the generating output of over 396,000 PV solar panels.

Table 6
Potential Green House Gas Equivalencies Avoided

System Level Gross Generation Energy Impact	170,211,962	kWh/Yr.
Green House Gas Reduction*		
Energy in kWh	**170,211,962**	kWh/year
Energy in MWh	170,212	MWh/year
CO2 - Carbon Dioxide	134,159	Tons per Year
CH4 - Methane	8	Tons per Year
N2O - Nitrous Oxide	2	Tons per Year
Green House Gas Equivalencies**		
Less Passenger Vehicles	27,125	
Less miles/year driven (avg passenger vehicle)	310,477,048	
Wind turbines installed	32	
Acres of US forest CO2 sequestered in one year	149,205	
Fossil Fuel Reduction Comparison to PV and SWH		
Rooftop PV Panels (300W) to offset same energy usage	396,138	
Solar Water Heating Systems to offset same energy usage	74,460	

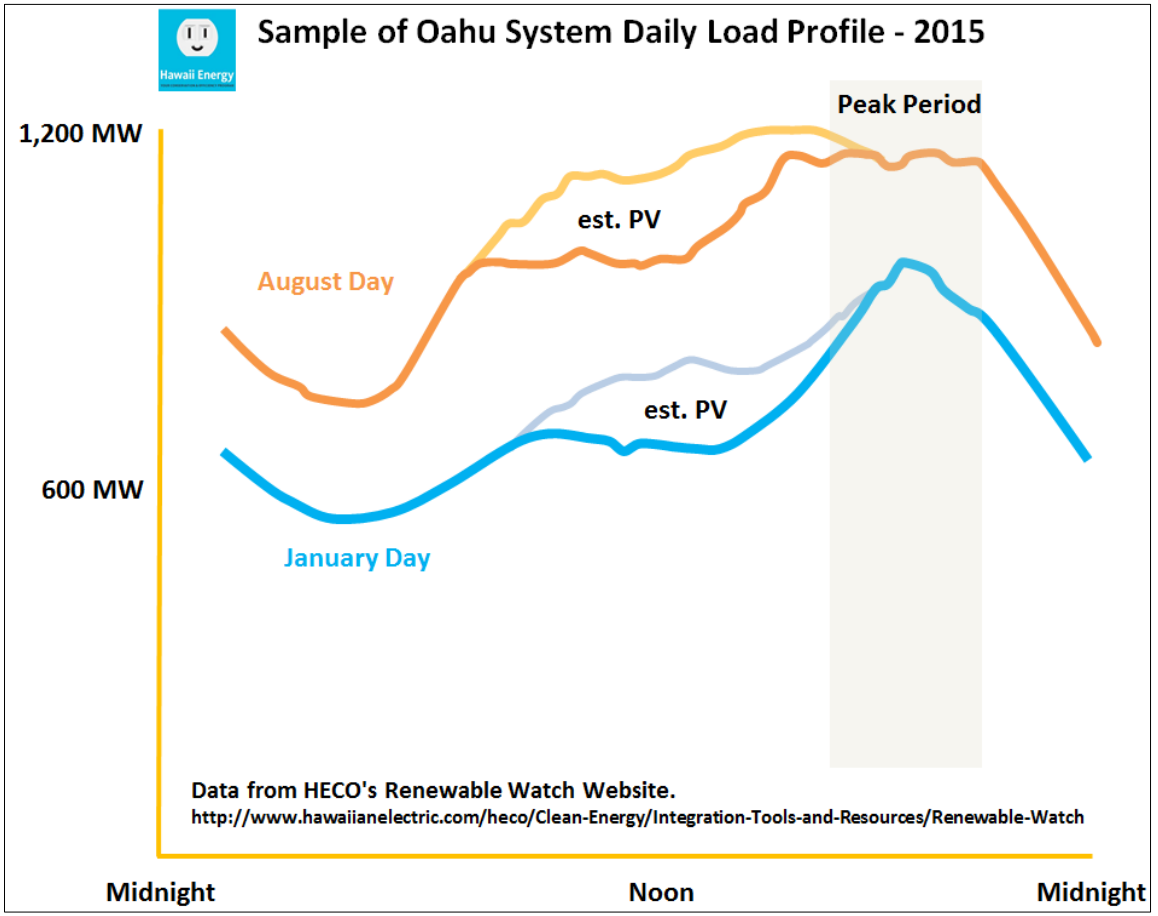
* Power Profiler - HICC - Oahu - Excel tool and Website
http://oaspub.epa.gov/powpro/ept_pack.charts
** EPA's Greenhouse Gas Equivalencies Calculator
https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Performance Indicator #2: Peak Demand Savings

Target: 21,640 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.

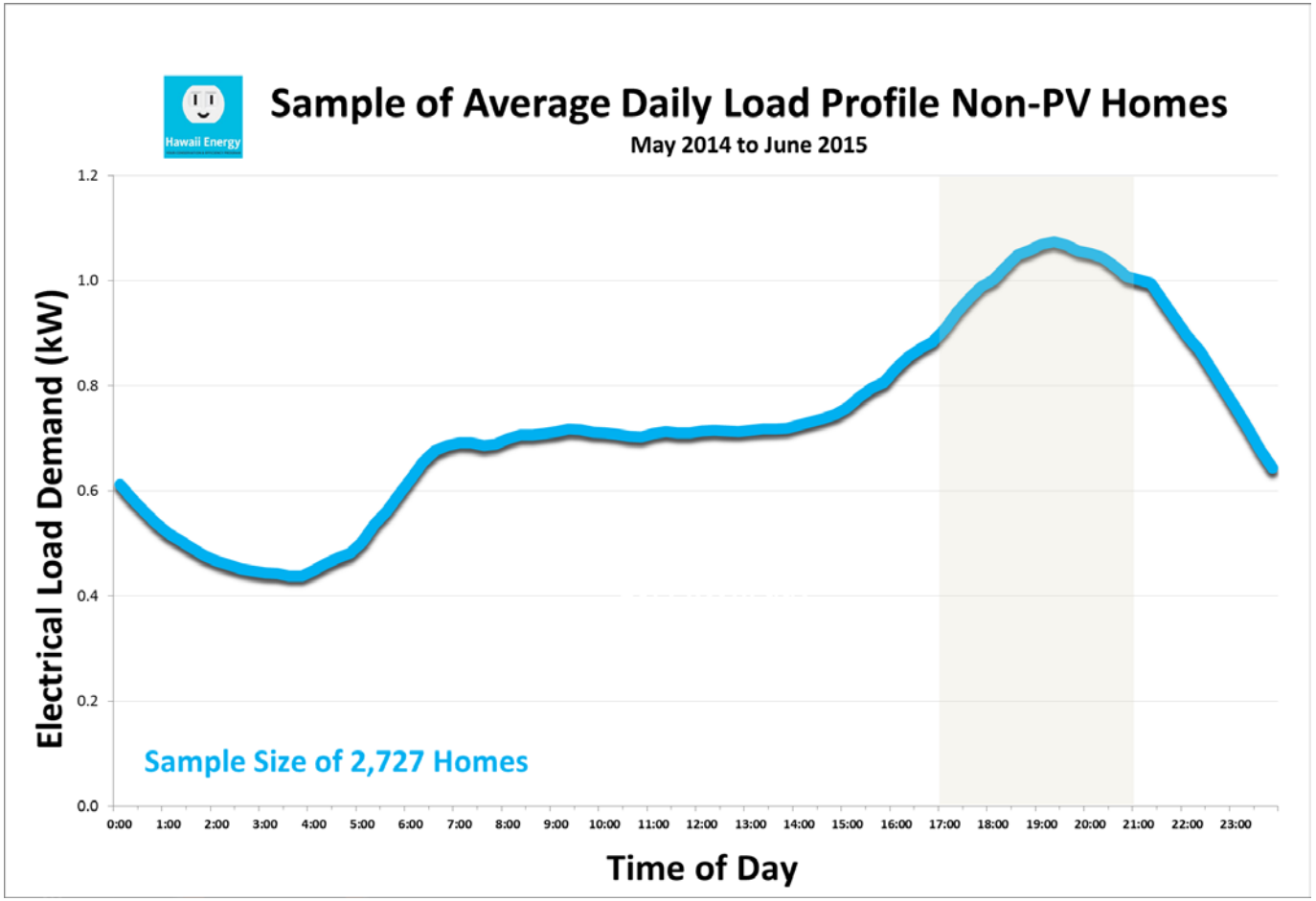
Figure 2
Average Daily Seasonal Demand (Load) Profile + Rooftop PV Generation



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 PY17 peak demand reduction target was 21,640 kW. The Program achieved 97% of this target, reducing peak demand by 20,726 kW. This is equivalent to the average peak power consumption of 20,726 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.**

Two issues drive the Program's ability to plan for (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 58% of Commercial program incentives and 46% of Commercial program demand reduction are based on projects that employ project-unique operating hours, specifically CBEEM and Energy Advantage 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: $ 327,453,747

The Total Resource Benefit (TRB) is the estimated total net present value (NPV) of the avoided cost for the utility from the reduced lifetime demand (kW) and energy (kWh) from energy efficiency projects and measures. The utility costs were determined based on PY15 guidelines to use an initial $0.161/kWh avoided cost figure and escalate it at 3% per year. This is further explained in the *Development of Avoided Costs* section at the end of this report. Average annual avoided cost for capacity and energy for calendar year 2015 escalated for a 20-year period was the basis for the analysis. The TRB incorporated avoided transmission and distribution costs into the avoided energy and capacity costs. The time value of money is represented by a discount rate of 6%. The discount rate is used to convert all costs and benefits to a "net present value" for comparing alternative costs and benefits in the same years' dollars.

Table 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

Life	Discount Rate							kW Target	kWh Target		Project Cost
8	6%							25	25,000		$45,000
		Utility Avoided Cost		NPV for each Year		Cumulative NPV		TRB			
Year	Measure Life	NPV Multiplier	$/kW/yr	$/kWh/yr	$/kW/yr	$/kWh/yr.	$/kW/yr	$/kWh/yr	Capacity Benefit	Energy Benefit	Total Resource Benefit	TRB/TRC Ratio
2017	1	1	$0	$0.171	$0	$0.1708	$0	$0.1708	$0	$4,270	$4,270	0.09
2018	2	$0.94	$0	$0.176	$0	$0.1660	$0	$0.3368	$0	$8,419	$8,419	0.19
2019	3	$0.89	$0	$0.181	$0	$0.1613	$0	$0.4980	$0	$12,451	$12,451	0.28
2020	4	$0.84	$904	$0.187	$759	$0.1567	$759.02	$0.6548	$18,975	$16,369	$35,344	0.79
2021	5	$0.79	$986	$0.192	$781.00	$0.1523	$1,540.02	$0.8070	$38,501	$20,176	$58,676	1.30
2022	6	$0.75	$856	$0.198	$639.65	$0.1480	$2,179.67	$0.9550	$54,492	$23,875	$78,367	1.74
2023	7	$0.70	$750	$0.204	$528.72	$0.1438	$2,708.39	$1.0988	$67,710	$27,469	$95,179	2.12
2024	8	$0.67	$663	$0.210	$440.93	$0.1397	$3,149.33	$1.2385	$78,733	$30,962	$109,695	2.44
2025	9	$0.63	$590	$0.216	$370.17	$0.1358	$3,519.50	$1.3742	$87,987	$34,356	$122,343	2.72

Performance #4: Market Transformation

Transformational Programs

Key Focus Areas	Metrics
Behavior Modification	
- Workshops & Presentations	2,100 Participant-hours
- Gamification Campaigns & Competitions	200 Participants
- Social media & mobile Messaging	3,250 Digital Engagements
- Transformational Videos	3 Videos Produced
Professional Development & Technical Training	8,370 Participant-hours
- Clean Energy Ally Support	
- Targeted Ally Training Opportunities	
- Targeted Participant Training Opportunities	
- Educator Training & Grants	
- Energy Industry Workforce Development	
Energy in Decision Making	
- Strategic Energy Management (SEM)	2 Cohort Participants
Codes & Standards	
- Codes Adoption – County Level	9 Advocacy Events
- Code-Related Training & Compliance	70 Participant-hours
- Leading Edge Technologies and Strategies	4 Stakeholder Meetings/ 1 Report

Figure 4
Summary of Transformational Programs

Behavior Modification	"Energy Unplugged " Workshops
	"Sharing the Aloha" Workshops
	Blue Planet Student Workshops and Energy Summit
	Maui Economic Development Board STEM Conference
	Various Community Education Support
	Renew/Rebuild Forum
	Social Media/Mobile Messaging
	Transformational Videos
Professional Development & Technical Training	Clean Energy Ally Support and Trainings
	Building Operator Certification® Courses
	Certified Energy Manager® Training
	HVAC and Power Quality training
	Advanced LED Lighting and Controls Training
	Pacific Water Conference
	Commercial Kitchen Efficiency training
	Program Trainings (Sector Specific)
	DOE Energy Efficiency Educator Training
	Blue Planet Educator Training
	Maui Economic Development Board STEM Conference (Educator Training)
	Retro-commissioning training
	Practical Energy Management for Buildings training
	Hawai'i Energy Fellows program
Energy In Decision-Making	Continuous Energy Improvement (CEI) program
	First Fuel data analytics
Codes and Standards	Advocacy and Legislative Support
	IECC 2015 Multi-Island trainings
	Energy Efficiency Codes Coordination Subcommittee meetings and report

Transformational efforts are those that involve education, training and support of policy initiatives that may not result in immediate or direct, quantifiable energy savings. The focus of this year's target was to build on past successes with community partnerships to deliver energy education to specific "hard-to-reach" communities and industries. Other priorities included providing the government sector and design and construction community with free technical trainings to understand and implement the International Energy Conservation Code (IECC) version 2015, signed into law by Governor David Ige in March 2017. A third focus area was the next iteration of training efforts and data analysis for organizations and businesses participating in the Program's Continuous Energy Improvement cohort. Engagement with the twelve-month program is expected to assist organizations with achieving energy savings and increased operational efficiency through deep-rooted transformation, including behavioral modification and deeper understanding of the building systems.

Figure 4 provides a list of the Market Transformation programs and results for PY17.

Performance #5: Island Equity (Broad Participation)

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

The Island Equity target is intended to promote the equitable participation in the Program among the counties. For PY17, "equitable" would achieve the goal that for every dollar contributed to the PBF, a dollar would be returned to its county of origin through rebates, incentives, trainings and other Program initiatives.

Table 8 lists the results of the PY17 contributions to the PBF by island and county.

Table 8
PY2017 Contributions to PBF

Island	Residential Program Investment	Business Program Investment	PBFA Investment	%
Hawai'i Island	$1,702,754	$1,160,968	$2,863,722	13.5%
Lāna'i	$31,033	$39,826	$70,859	0.3%
Maui	$1,470,204	$1,233,252	$2,703,455	12.8%
Moloka'i	$43,106	$32,203	$75,308	0.4%
O'ahu	$6,591,069	$8,865,749	$15,456,818	73.0%
Totals	**$9,838,164**	**$11,331,998**	**$21,170,162**	**100%**
County	**Residential Program Investment**	**Business Program Investment**	**PBFA Investment**	**%**
Hawai'i	$1,702,754	$1,160,968	$2,863,722	13.5%
Maui	$1,544,342	$1,305,281	$2,849,622	13.5%
Honolulu	$6,591,069	$8,865,749	$15,456,818	73.0%
Totals	**$9,838,164**	**$11,331,998**	**$21,170,162**	**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 $975,330.10 in performance amounts (inclusive of tax) was allotted for PY17.

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 PY17, is $969,150.89 (including tax) or 99.4% 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: $146,300.00

The Program Energy Reduction was 136,600,252 kWh, which was 105% of the target of 130,144,871 kWh in the award claim of $146,300. This amount is calculated from $109,725.00 for meeting the minimum Milestone level (75%) and $36,575.00 for the remaining savings of 32,536,218 kWh awarded at a rate of $0.001124/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	$109,725	$146,300.00	
Energy Reduction Award Pools in Metrics %	75%	100%	
Energy Reduction Goals (kWh)	97,608,653	130,144,871	
Energy Reduction Goals Pools in Metrics %	75%	100%	
Incentive Calculations	**Meet Milestone**	**Target less Milestone**	**Total**
Pool Award Potential	$109,725	$36,575	$146,300
Energy Goal Pools (kWh)	97,608,653	32,536,218	130,144,871
Award Amount / Rate ($/kWh)	$0.001124	$0.001124	
Energy Achievement (kWh)	97,608,653	38,991,599	136,600,252
Award Amount / Rate ($/kWh)	$0.001124	$0.001124	
Energy Achievement Award Calculation	$109,725.00	$36,575.00	$146,300.00
Energy Reduction Performance Award Claim			**$146,300.00**

Peak Demand Savings Award Claim: $140,120.79

The Combined Peak Demand Reduction was 20,726 kW, which was 96% of the target savings level resulting in an award claim of $140,120.79. This award is calculated from $109,725.00 for meeting the minimum level and $30,395.79 for meeting the target. Levels are awarded at a rate of $6.76063/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	$109,725	$146,300	
Demand Reduction Award Pools in Metrics %	75%	100%	
Demand Reduction Goals (kW)	16,230	21,640	
Demand Reduction Goals Pools in Metrics %	75%	100%	
Incentive Calculations	**Meet Milestone**	**Target less Milestone**	**Total**
Pool Award Potential	$109,725.00	$36,575.00	$146,300.00
Demand Goal Pools (kW)	16,230	5,410	21,640
Award Amount / Rate ($/kW)	$6.76063	$6.76063	
Demand Savings Achievement (kW)	16,230	4,496	20,726
Award Amount / Rate ($/kW)	$6.76063	$6.76063	
Demand Savings Achievement Award Calculation	$109,725.00	$39,395.79	$140,120.79
Demand Reduction Performance Award Claim			**$140,120.79**

Total Resource Benefit (TRB) Award Claim: $390,132.00

The TRB achievement of $333,848,273 NPV is 103.9% of the target amount. This award claim of $390,132.00 is calculated from $292,599.00 for meeting the minimum level and $97,533.00 for the remaining 25% awarded at a rate of $3,901.32/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	$292,599	$390,132	
TRB Award Pools in Metrics %	75%	100%	
TRB Goals ($)	$245,590,310	$327,453,747	
TRB Goals Pools in Metrics %	75%	100%	
Incentive Calculations	**Meet Milestone**	**Target less Milestone**	**Total**
Pool Award Potential	$292,599.00	$97,533.00	$390,132.00
TRB Goal Pools in Metrics %	75%	25%	100.00%
Award Amount / Rate ($/%)	$3,901.32	$3,901.32	
TRB Achievement in $			$333,848,273
TRB Goals in $			$327,453,747
TRB Savings Achievement in Metrics %	75%	25.00%	101.95%
Award Amount / Rate ($/%)	$3,901.32	$3,901.32	
TRB Energy Achievement Award Calculation	$292,599.00	$97,533.00	$390,132.00
TRB NPV of Utility Cost Reduction Performance Award Claim			**$ 390,132.00**

Economically Disadvantaged Award Claim: $68,273.10

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 PY17, the Program exceeded each of the four metrics, as shown in **Table 12**, resulting in the total award claim of $68,273.10.

Table 12
Economically Disadvantaged Award Claim Calculation

Target Metrics	**Milestone**	**Target**	
Award Potential	$ 51,204.83	$68,273	
Award Pools in Metrics %	75%	100%	
SBDIL - kWh Target	5,175,000	6,900,000	
SBDIL - Customers Served Target	469	625	
MFDI - kWh Target	975,000	1,300,000	
MFDI - Customers Served Target	3,225	4,300	
Incentive Calculations	**Meet Milestone**	**Target less Milestone**	**Total Achieved**
Pool Award Potential	$ 51,204.83	$ 17,068.28	$ 68,273.10
Goal Pools in Metrics %	75%	25%	100.00%
Award Amount / Rate ($/%)	$ 682.73	$ 682.73	
SBDIL - kWh Achievement	5,175,000	3,616,690	8,791,690
SBDIL - kWh Target	5,175,000	1,725,000	6,900,000
Target met?	Yes	Yes	
Award - 25%	$ 12,801.21	$ 4,267.07	$ 17,068.28
SBDIL - Customers Served Achievement	469	300	769
SBDIL - Customers Served Target	469	156	625
Target met?	Yes	Yes	
Award - 25%	$ 12,801.21	$ 4,267.07	$ 17,068.28
MFDI - kWh Achievement	975,000	837,598	1,812,598
MFDI - kWh Target	975,000	325,000	1,300,000
Target met?	Yes	Yes	
Award - 25%	$ 12,801.21	$ 4,267.07	$ 17,068.28
MFDI - Customers Served Achievement	3,225	2,739	5,964
MFDI - Customers Served Target	3,225	1,075	4,300
Target met?	Yes	Yes	
Award - 25%	$ 12,801.21	$ 4,267.07	$ 17,068.28
Economically Disadvantaged Performance Award Claim			**$ 68,273.10**

Island Equity (Broad Participation) Award Claim: $97,533.00

The Program achieved the targeted percentages of Island Equity this performance period. Because it is impossible for targets to be met precisely, successfully meeting the target for each county is established with the following ratio, specifically $\frac{\%\ Incentive\ Spend}{\%\ PBF\ Target}$, 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 13.5% of total PBF funds and the Program distributed 14.6% of incentives to Hawai'i County, therefore achieving a spend-to-contribution ratio of 99.1%. Nevertheless, island equity is measured against the PBF Target, therefore in the case of Hawai'i Island, the ratio was 103.2%. Maui County witnessed a similar outcome. See **Table 13** for details.

Table 13
Island Equity Award Claim Calculation

County	PY17 PBF Contribution ($)	PY17 PBF Contribution (%)	PBF Target (%)*	Incentive Spend ($)**	Incentive Spend (%)**	% Incentive Spend / % PBF Contribution	% Incentive Spend / % PBF Target	Target Range	Met Minimum	Award Claim
Honolulu	$ 15,456,818	73.0%	74.0%	$ 15,088,597.47	71.8%	98.4%	97.1%	-	Yes	
Hawai'i	$ 2,863,722	13.5%	13.0%	$ 2,817,276.21	13.4%	99.1%	103.2%	≥ 80%	Yes	
Maui	$ 2,849,622	13.5%	13.0%	$ 3,099,859.41	14.8%	109.6%	113.5%	≥ 80%	Yes	
Total	$ 21,170,162	100.0%	100.0%	$ 21,005,733.09	100.00%					$97,533.00
Island Equity Performance Award Claim										**$97,533.00**

The PY17 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)

PY17 Annual Plan Budget

Pursuant to the Program's approved PY17 Annual Plan, the Program's initial budget for the program year was $29.6M, comprised of $19.1M in Incentives, $8.8M in Non-Incentives, and $1.8M in Transformational Incentives. As detailed in **Table 14** approximately 45% of the services and initiatives budget was allocated to Residential Programs and 55% to Business Programs.

Budget Transfers and Reallocations

The 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. This budgetary mechanism proved helpful again this year, as the Program was able to reallocate funds from Residential to Business Incentives, to respond to changing market demand. Specifics of the internal transfers are detailed in **Table 15**.

Table 14
PY17 Annual Plan Budget
(in $)

Activity	Non-Incentive	Incentive	Total
Residential Programs			
REEM	1,140,000	6,934,747	8,074,747
CREEM	115,000	408,000	523,000
RESM	35,000	275,000	310,000
RHTR	215,000	847,310	1,062,310
Total Residential Programs	**1,505,000**	**8,465,057**	**9,970,057**
Residential Market Evaluation	**39,603**	**0**	**39,603**
Residential Outreach	**785,000**	**0**	**785,000**
Total Residential Services and Initiatives	**2,329,603**	**8,465,057**	**10,794,660**
Business Programs			
BEEM	990,000	4,786,212	5,776,212
CBEEM	740,000	2,668,522	3,408,522
BESM	55,000	203,500	258,500
BHTR	450,000	2,951,577	3,401,577
Total Business Programs	**2,235,000**	**10,609,811**	**12,844,811**
Business Market Evaluation	**78,371**	**0**	**78,371**
Business Outreach	**410,000**	**0**	**410,000**
Total Business Services and Initiatives	**2,723,371**	**10,609,811**	**13,333,182**
Total Residential and Business Services and Initiatives	**5,052,974**	**19,074,868**	**24,127,842**
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	**1,942,708**	**0**	**1,942,708**
Total Infrastructure/Facility Fee	476,404	0	476,404
Total Tax on Non-Incentive	352,085	0	352,085
Performance Amount	975,330	0	975,330
Total Estimated Contractor Costs *	**8,799,501**	**20,824,868**	**29,624,369**

Internal Budget Transfers

- **January 2018** – Reallocated PY16 unspent funds to PY17 per supplemental modification #1 (total fund carry over was $391,929.29). In addition, transferred Business Incentive budget as follows: FROM BEEM ($700,000), BESM ($150,000) and BHTR ($300,000) TO CBEEM ($1,150,000). Funds were moved to CBEEM in order to keep the custom projects offering solvent, based on the current backlog. Projections showed a slower burn rate for BEEM, BESM, and BHTR projects, allowing for a temporary transfer of funds to CBEEM.
- **March 2018** – Reallocated funds, moving 3% of the total Residential budget to Business incentives. Budget transfers were made in Residential and Business Incentives: FROM REEM ($200,000), CREEM ($370,000), and BESM ($50,000) TO RESM ($100,000), RHTR ($120,000), and BHTR ($400,000). The Residential transfers were funds associated with REEM and CREEM projects. On the REEM side, the dollars were mostly associated with a slow start to the Variable Refrigerant Flow (VRF) program, which changed to a contractor based model in PY17. For CREEM, emerging technology and new construction programs were slower to start than planned, and these efforts were being shifted to PY18. Furthermore, given that these channels were new, funds allocated to these areas during PY17 planning were robust. The reductions to REEM and CREEM also helped offset higher projections in RESM and RHTR, driven by tune-up offerings (AC and Solar Water Heater) and multi-family direct install residential schedule units, respectively. On the Business side, Residential funds were reallocated to BHTR, driven by a robust pipeline in our Small Business Direct Install Lighting (SBDIL) program. The onboarding of new program contractors created extra demand for this offering. In R2 the Program temporarily moved funds out of BHTR and into CBEEM in anticipation of a stronger burn rate in custom projects. As always, project timelines can shift, and funding allocations are preferential to where payment is acutely needed, all else being equal.
- **April 2018 –** Reallocated funds, representing 2% of the total Residential budget to Business incentives (with March 2018 reallocation this reflected a net 5% of total Residential budget being moved to Business Incentives). Budget transfers were made in Residential and Business Incentives: FROM REEM ($280,000) and RHTR ($20,000) TO CREEM ($20,000), RESM ($30,000), CBEEM ($205,000), BESM ($5,000) and BHTR ($40,000). For REEM, the dollars were adjusted based on current year-end projections for the Variable Refrigerant Flow (VRF) program, LED's, and midstream washers and dryers. The VRF Program had a slow start, as it transitioned to a contractor based model in PY17, while the Program started to ramp down LED counts in an effort to make the transition to PY18 as smooth as possible. The transfer from RTHR reflected the participation of more Multi-Family Direct Install (MFDI) units that were located on commercial rate schedule properties (BHTR). The reductions to REEM also helped offset slightly higher projections in CREEM and RESM. On the Business side, Residential funds were reallocated to CBEEM, which was driven by custom projects slated to be completed in PY17. In addition, Residential and Business Operations and Management budget was transferred as follows: FROM Residential Outreach ($45,000), CBEEM ($20,000) and Business Outreach ($25,000) TO Residential Market Evaluation ($45,000) and Business Market Evaluation ($45,000). The transfers were associated with higher spend than in previous years in the area of evaluation as a result of the heavy Energy Management and Verification (EM&V) activity.
- **May 2018 –** Transferred Residential Incentive budget as follows: FROM CREEM ($30,000), and RHTR ($66,000) TO REEM ($85,000) and RESM ($11,000). Transferred Business Incentive budget as follows: FROM CBEEM ($3,000) and BESM ($5,000) TO BEEM ($3,000) and BHTR ($5,000). All incentive transfers were associated with the final year-end close out of incentives. Transferred Residential Operations and Management budget as follows: FROM Residential Outreach ($20,000) TO Residential Market Evaluation ($20,000). Transferred Business Operations and Management budget as follows: FROM CBEEM ($40,000) TO Business Market Evaluation ($40,000). The transfers were associated with continued higher spend than in previous years in the area of evaluation as a result of the heavy Energy Management and Verification (EM&V) activity.
- **July 2018 –** Transferred Residential Operations and Management budget as follows: FROM CREEM ($90,000) and Residential Outreach ($30,000) TO REEM ($75,000) and RHTR ($45,000). Transferred Business Operations and Management budget as follows: FROM BESM ($2,000) TO BHTR ($1,000) and Business Market Evaluation ($1,000). Completed several small transfers within Residential and Business Operations to align funding to final year incentive spend.

Table 15
Budget Progression 7/1/17-6/30/18

	Annual Plan Budget	Contract Mod #1 (1/2018)	PY17 Budget as of 1/2018 (R1)	Incentive Transfers (1/2018)	PY17 Budget as of 1/2018 (R2)	Incentive Transfers (3/2018)	PY17 Budget as of 3/2018 (R3)	T&M Transfers (4/2018)	Incentive Transfers (4/2018)	PY17 Budget as of 4/2018 (R4)	T&M Transfers (5/2018)	Incentive Transfers (5/2018)	PY17 Budget as of 5/2018 (R5)	T&M Transfers (7/2018)	Incentive Transfers (7/2018)	PY17 Budget as of 7/2018 (R6)
Residential Programs																
Residential Program Ops and Management																
REEM	$1,140,000		$1,140,000		$1,140,000		$1,140,000			$1,140,000			$1,140,000	$75,000		$1,215,000
CREEM	$115,000		$115,000		$115,000		$115,000			$115,000			$115,000	-$90,000		$25,000
RESM	$35,000		$35,000		$35,000		$35,000			$35,000			$35,000			$35,000
RHTR	$215,000		$215,000		$215,000		$215,000			$215,000			$215,000	$45,000		$260,000
Total Residential Programs	$1,505,000	$0	$1,505,000	$0	$1,505,000	$0	$1,505,000	$0	$0	$1,505,000	$0	$0	$1,505,000	$30,000	$0	$1,535,000
Residential Market Evaluation	$39,603	$72	$39,675		$39,675		$39,675	$45,000		$84,675	$20,000		$104,675			$104,675
Residential Outreach	$785,000		$785,000		$785,000		$785,000	-$45,000		$740,000	-$20,000		$720,000	-$30,000		$690,000
Total Residential Ops & Management	$2,329,603	$72	$2,329,675	$0	$2,329,675	$0	$2,329,675	$0	$0	$2,329,675	$0	$0	$2,329,675	$0	$0	$2,329,675
Residential Incentives																
REEM	$6,934,747	$21,189	$6,955,936		$6,955,936	-$200,000	$6,755,936		-$280,000	$6,475,936		$85,000	$6,560,936			$6,560,936
CREEM	$408,000		$408,000		$408,000	-$370,000	$38,000		$20,000	$58,000		-$30,000	$28,000			$28,000
RESM	$275,000	$913	$275,913		$275,913	$100,000	$375,913		$30,000	$405,913		$11,000	$416,913			$416,913
RHTR	$847,310	$54,752	$902,062		$902,062	$120,000	$1,022,062		-$20,000	$1,002,062		-$66,000	$936,062			$936,062
Subtotal Residential Incentives	$8,465,057	$76,853	$8,541,910	$0	$8,541,910	-$350,000	$8,191,910	$0	-$250,000	$7,941,910	$0	$0	$7,941,910	$0	$0	$7,941,910
Residential Transformational	$851,373	$68,183	$919,556		$919,556		$919,556			$919,556			$919,556			$919,556
Total Residential Incentives	$9,316,430	$145,036	$9,461,466	$0	$9,461,466	-$350,000	$9,111,466	$0	-$250,000	$8,861,466	$0	$0	$8,861,466	$0	$0	$8,861,466
Total Residential Programs	**$11,646,033**	**$145,108**	**$11,791,141**	**$0**	**$11,791,141**	**-$350,000**	**$11,441,141**	**$0**	**-$250,000**	**$11,191,141**	**$0**	**$0**	**$11,191,141**	**$0**	**$0**	**$11,191,141**
Business (C&I) Programs																
Business Programs Ops and Management																
BEEM	$990,000		$990,000		$990,000		$990,000			$990,000			$990,000			$990,000
CBEEM	$740,000		$740,000		$740,000		$740,000	-$20,000		$720,000	-$40,000		$680,000			$680,000
BESM	$55,000		$55,000		$55,000		$55,000			$55,000			$55,000	-$2,000		$53,000
BHTR	$450,000		$450,000		$450,000		$450,000			$450,000			$450,000	$1,000		$451,000
Total Business Programs	$2,235,000	$0	$2,235,000	$0	$2,235,000	$0	$2,235,000	-$20,000	$0	$2,215,000	-$40,000	$0	$2,175,000	-$1,000	$0	$2,174,000
Business Market Evaluation	$78,371	$17,033	$95,404		$95,404		$95,404	$45,000		$140,404	$40,000		$180,404	$1,000		$181,404
Business Outreach	$410,000		$410,000		$410,000		$410,000	-$25,000		$385,000			$385,000			$385,000
Total Business Ops & Management	$2,723,371	$17,033	$2,740,404		$2,740,404		$2,740,404	$0		$2,740,404	$0		$2,740,404	$0	$0	$2,740,404

Table 15, cont'd Budget Progression 7/1/17-6/30/18															
	Annual Plan Budget	Contract Mod #1 (1/2018)	PY17 Budget as of 1/2018 (R1)	Incentive Transfers (1/2018)	PY17 Budget as of 1/2018 (R2)	Incentive Transfers (3/2018)	PY17 Budget as of 3/2018 (R3)	T&M Transfers (4/2018)	Incentive Transfers (4/2018)	PY17 Budget as of 4/2018 (R4)	T&M Transfers (5/2018)	Incentive Transfers (5/2018)	PY17 Budget as of 5/2018 (R5)	T&M Transfers (7/2018)	Incentive Transfers (7/2018)	PY17 Budget as of 7/2018 (R6)
Business Incentives																
BEEM	$4,786,212	$5,979	$4,792,191	-$700,000	$4,092,191		$4,092,191			$4,092,191		$3,000	$4,095,191			$4,095,191
CBEEM	$2,668,522	$8,628	$2,677,150	$1,150,000	$3,827,150		$3,827,150		$205,000	$4,032,150		-$3,000	$4,029,150			$4,029,150
BESM	$203,500	$0	$203,500	-$150,000	$53,500	-$50,000	$3,500		$5,000	$8,500		-$5,000	$3,500			$3,500
BHTR	$2,951,577	$10,120	$2,961,697	-$300,000	$2,661,697	$400,000	$3,061,697		$40,000	$3,101,697		$5,000	$3,106,697			$3,106,697
Subtotal Business Incentives	$10,609,811	$24,727	$10,634,538	$0	$10,634,538	$350,000	$10,984,538	$0	$250,000	$11,234,538	$0	$0	$11,234,538	$0	$0	$11,234,538
Business Transformational	$898,627	$121,226	$1,019,853		$1,019,853		$1,019,853			$1,019,853			$1,019,853			$1,019,853
Total Business Incentives	$11,508,438	$145,953	$11,654,391	$0	$11,654,391	$350,000	$12,004,391	$0	$250,000	$12,254,391	$0	$0	$12,254,391	$0	$0	$12,254,391
Total Business Programs	**$14,231,809**	**$162,986**	**$14,394,795**	**$0**	**$14,394,795**	**$350,000**	**$14,744,795**	**$0**	**$250,000**	**$14,994,795**	**$0**	**$0**	**$14,994,795**	**$0**	**$0**	**$14,994,795**
Supporting Services	**$1,942,708**	**$79,293**	**$2,022,001**	**$0**	**$2,022,001**	**$0**	**$2,022,001**	**$0**	**$0**	**$2,022,001**	**$0**	**$0**	**$2,022,001**	**$0**	**$0**	**$2,022,001**
Infrastructure/Facility Fee	**$476,404**	**$0**	**$476,404**	**$0**	**$476,404**	**$0**	**$476,404**	**$0**	**$0**	**$476,404**	**$0**	**$0**	**$476,404**	**$0**	**$0**	**$476,404**
Subtotal Non-Incentive (Prior to Tax)	$7,472,086	$96,398	$7,568,484		$7,568,484		$7,568,484			$7,568,484			$7,568,484			$7,568,484
Total Tax on Non-Incentive	$352,085	$4,542	**$356,627**		**$356,627**		**$356,627**			**$356,627**			**$356,627**			**$356,627**
Performance Amount (Inclusive of Tax)	$975,330		$975,330		$975,330		$975,330			$975,330			$975,330			$975,330
Subtotal Non-Incentives	***$8,799,501***	***$100,940***	***$8,900,441***	***$0***	***$8,900,441***	***$0***	***$8,900,441***	***$0***	***$0***	***$8,900,441***	***$0***	***$0***	***$8,900,441***	***$0***	***$0***	***$8,900,441***
Subtotal Residential & Business Customer Incentives	***$19,074,868***	***$101,580***	***$19,176,448***	***$0***	***$19,176,448***	***$0***	***$19,176,448***	***$0***	***$0***	***$19,176,448***	***$0***	***$0***	***$19,176,448***	***$0***	***$0***	***$19,176,448***
Subtotal Transformational Incentives	***$1,750,000***	***$189,409***	***$1,939,409***	***$0***	***$1,939,409***	***$0***	***$1,939,409***	***$0***	***$0***	***$1,939,409***	***$0***	***$0***	***$1,939,409***	***$0***	***$0***	***$1,939,409***
Subtotal Customer & Transformational Incentives	***$20,824,868***	***$290,989***	***$21,115,857***	***$0***	***$21,115,857***	***$0***	***$21,115,857***	***$0***	***$0***	***$21,115,857***	***$0***	***$0***	***$21,115,857***	***$0***	***$0***	***$21,115,857***
Total Estimated Contractor Costs	**$29,624,369**	**$391,929**	**$30,016,298**	**$0**	**$30,016,298**	**$0**	**$30,016,298**	**$0**	**$0**	**$30,016,298**	**$0**	**$0**	**$30,016,298**	**$0**	**$0**	**$30,016,298**

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, 97.5% of budgeted Non-Incentives (excludes performance amounts), and 98% of budgeted Transformational Incentives. Details of final PY17 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

	Total Expenditures (in $)	PY17 Budget (R6) (in $)	Percent Spent	Unspent (in $)	Percent Unspent
Residential Programs					
Residential Program Ops and Management					
REEM	1,213,171.11	1,215,000.00	99.85%	1,828.89	0.15%
CREEM	24,655.41	25,000.00	98.62%	344.59	1.38%
RESM	34,618.14	35,000.00	98.91%	381.86	1.09%
RHTR	259,526.22	260,000.00	99.82%	473.78	0.18%
Total Residential Programs	1,531,970.88	1,535,000.00	99.80%	3,029.12	0.20%
Residential Evaluation	99,755.51	104,675.49	95.30%	4,919.98	4.70%
Residential Outreach	625,153.19	690,000.00	90.60%	64,846.81	9.40%
Total Residential Non-Incentives	**2,256,879.58**	**2,329,675.49**	**96.88%**	**72,795.91**	**3.12%**
Residential Incentives					
REEM	6,555,398.78	6,560,935.78	99.92%	5,537.00	0.08%
CREEM	20,350.00	28,000.00	72.68%	7,650.00	27.32%
RESM	415,900.00	416,912.50	99.76%	1,012.50	0.24%
RHTR	881,160.51	936,061.98	94.13%	54,901.47	5.87%
Subtotal Residential Incentives	7,872,809.29	7,941,910.26	99.13%	69,100.97	0.87%
Residential Transformational	901,847.86	919,555.60	98.07%	17,707.74	1.93%
Total Residential Incentives	**8,774,657.15**	**8,861,465.86**	**99.02%**	**86,808.71**	**0.98%**
Total Residential Programs	**11,031,536.73**	**11,191,141.35**	**98.57%**	**159,604.62**	**1.43%**

Table 16 (cont'd) Program Expenditures and Unspent Funds					
	Total Expenditures (in $)	**PY17 Budget (R6) (in $)**	**Percent Spent**	**Unspent (in $)**	**Percent Unspent**
Business Programs					
Business Programs Ops and Management					
BEEM	970,539.67	990,000.00	98.03%	19,460.33	1.97%
CBEEM	641,461.13	680,000.00	94.33%	38,538.87	5.67%
BESM	44,911.03	53,000.00	84.74%	8,088.97	15.26%
BHTR	450,705.92	451,000.00	99.93%	294.08	0.07%
Total Business Programs	2,107,617.75	2,174,000.00	96.95%	66,382.25	3.05%
Business Evaluation	181,399.77	181,403.68	100.00%	3.91	0.00%
Business Outreach	337,515.44	385,000.00	87.67%	47,484.56	12.33%
Total Business Non-Incentives	**2,626,532.96**	**2,740,403.68**	**95.84%**	**113,870.72**	**4.16%**
Business Incentives					
BEEM	4,095,059.67	4,095,191.11	100.00%	131.44	0.00%
CBEEM	4,026,757.89	4,029,149.56	99.94%	2,391.67	0.06%
BESM	1,350.00	3,500.00	38.57%	2,150.00	61.43%
BHTR	3,105,711.83	3,106,697.44	99.97%	985.61	0.03%
Subtotal Business Incentives	11,228,879.39	11,234,538.11	99.95%	5,658.72	0.05%
Business Transformational	1,002,196.55	1,019,853.04	98.27%	17,656.49	1.73%
Total Business Incentives	**12,231,075.94**	**12,254,391.15**	**99.81%**	**23,315.21**	**0.19%**
Total Business Programs	**14,857,608.90**	**14,994,794.83**	**99.09%**	**137,185.93**	**0.91%**
Total Services and Initiatives	**25,889,145.63**	**26,185,936.18**	**98.87%**	**296,790.55**	**1.13%**
Supporting Services					
Supporting Services	2,017,806.49	2,022,000.84	**99.79%**	**4,194.35**	**0.21%**
Total Supporting Services	**2,017,806.49**	**2,022,000.84**	**99.79%**	**4,194.35**	**0.21%**
Infrastructure/Facility Fee					
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)	7,377,622.99	7,568,484.01	97.48%	190,861.02	2.52%
Total Tax on Non-Incentive	347,633.60	356,626.97	97.48%	8,993.37	2.52%
Performance Amount (Inclusive of Tax)	-	975,330.00	0.00%	975,330.00	100.00%
Subtotal Non-Incentives Billed	*7,725,256.59*	*8,900,440.98*	86.80%	1,175,184.39	13.20%
Subtotal Residential and Business Customer Incentives	*19,101,688.68*	*19,176,448.37*	99.61%	74,759.69	0.39%
Subtotal Transformational Incentives	*1,904,044.41*	*1,939,408.64*	98.18%	35,364.23	1.82%
Subtotal Customer and Transformational incentives	*21,005,733.09*	*21,115,857.01*	99.48%	110,123.92	0.52%
Total Estimated Contractor Costs	**28,730,989.68**	**30,016,297.99**	**95.72%**	**1,285,308.31**	**4.28%**

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 PY2017 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 PY17 were:

- **First Year** – 136,660,252 kWh
  (42% in Residential and 58% in Business programs)
- **Lifetime** – 1,766,585,174 kWh
  (36% in Residential and 64% 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 11.1 years in PY17, up from 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 14.2 years in PY17, up from 13.9 years in PY16, up from 12.7 years in PY15 and 12.6 years in PY14. The shift to LED lighting, with its 15 year measure life, is a significant factor in the increasing average measure life.

Program Peak Demand reduction for PY17 was:

- **Peak Demand** – 20,726 kW (54.0% from Residential and 46.0% 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
Program Level Impact Summary by Program

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	620,081	$4,095,060	4,481	44,980,939	684,150,941	$0.091	$0.006
CBEEM	257	1,578	$4,026,758	3,400	23,060,505	287,979,829	$0.175	$0.014
BESM	18	18	$1,350	1	6,149	6,149	$0.220	$0.220
BHTR	2,400	69,759	$3,105,712	1,631	11,652,589	162,593,209	$0.267	$0.019
Commercial Total	**3,505**	**691,436**	**$11,228,879**	**9,514**	**79,700,182**	**1,134,730,129**	**$0.141**	**$0.010**
REEM	8,079	4,218,776	$6,555,399	10,508	53,871,892	610,535,140	$0.122	$0.011
CREEM	3	3	$20,350	7	51,057	251,411	$0.399	$0.081
RESM	4,775	4,774	$415,900	246	1,376,703	3,735,491	$0.302	$0.111
RHTR	2,209	34,973	$881,161	451	1,600,417	17,333,003	$0.551	$0.051
Residential Total	**15,066**	**4,258,526**	**$7,872,809**	**11,213**	**56,900,070**	**631,855,045**	**$0.138**	**$0.012**
Total	**18,571**	**4,949,962**	**$19,101,689**	**20,726**	**136,600,252**	**1,766,585,174**	**$0.140**	**$0.011**

Program	Total Resource Benefit (TRB)	Total Resource Cost (TRC)	Driven Benefit Ratio (TRB/Incentive $)	Driven Investment Ratio (TRC/Incentive $)	Benefit Test (TRB/TRC)
BEEM	$122,909,030	$42,319,422	30.0	10.3	2.9
CBEEM	$54,322,973	$69,927,523	13.5	17.4	0.8
BESM	$1,051	$5,400	0.8	4.0	0.2
BHTR	$31,977,410	$4,220,364	10.3	1.4	7.6
Commercial Total	**$209,210,465**	**$116,472,709**	**18.6**	**10.4**	**1.8**
REEM	$120,035,331	$44,715,393	18.3	6.8	2.7
CREEM	$50,995	$20,350	2.5	1.0	2.5
RESM	$716,227	$1,431,900	1.7	3.4	0.5
RHTR	$3,835,256	$945,226	4.4	1.1	4.1
Residential Total	**$124,637,808**	**$47,112,868**	**15.8**	**6.0**	**2.6**
Total	**$333,848,273**	**$163,585,578**	**17.5**	**8.6**	**2.0**

Savings at Program Levels

Measure Contribution toward Savings Impacts

In PY17, the Program incentivized 104 reporting equipment types in 14 different equipment 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 PY17.

- **#1 Contributor - High-Efficiency Lighting** – 58.6% of first year (up from 52.7% in PY16) and 67.4% lifetime energy savings (up from 60.7% in PY16).
- **#2 Contributor – Customized Project Measures** – 18% first year and 17.5% lifetime energy savings. Non-prescriptive lighting projects constituted the majority of projects in this category.
- **#3 Contributor – High-Efficiency HVAC** – 4.8% first year and 5.4% 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
		Total	%		kW	%	kWh	%	kWh	%	$	%	($/kWh)
1	High Efficiency Lighting	3,035	16.3%	2,365,694	9,008	43.5%	80,058,338	58.6%	1,189,850,812	67.4%	$8,620,807	45.1%	$0.007
2	Customized Project Measures	297	1.6%	4,216	3,600	17.4%	24,563,577	18.0%	309,625,448	17.5%	$4,346,843	22.8%	$0.014
3	High Efficiency HVAC	3,703	19.9%	5,252	1,235	6.0%	6,595,866	4.8%	95,312,275	5.4%	$1,509,981	7.9%	$0.016
4	High Efficiency Water Heating	3,716	20.0%	4,183	910	4.4%	3,889,851	2.8%	64,813,887	3.7%	$1,339,888	7.0%	$0.021
5	High Efficiency Appliances	4,301	23.2%	10,211	197	0.9%	3,485,791	2.6%	47,768,370	2.7%	$751,725	3.9%	$0.016
6	Commercial Kitchen	28	0.2%	74	259	1.3%	1,534,192	1.1%	22,849,400	1.3%	$367,950	1.9%	$0.016
7	Energy Awareness, Measurement and Control Systems	82	0.4%	2,535,202	4,608	22.2%	13,867,282	10.2%	14,384,324	0.8%	$1,223,904	6.4%	$0.085
8	High Efficiency Water Pumping	171	0.9%	180	30	0.1%	396,881	0.3%	5,550,929	0.3%	$64,145	0.3%	$0.012
9	Consumer Electronics	38	0.2%	11,024	85	0.4%	745,567	0.5%	4,536,411	0.3%	$126,387	0.7%	$0.028
10	Building Envelope Improvements	23	0.1%	0	88	0.4%	387,829	0.3%	3,878,289	0.2%	$73,339	0.4%	$0.019
11	Energy Conservation - Hot Water	1,332	7.2%	8,557	618	3.0%	515,115	0.4%	2,575,574	0.1%	$134,891	0.7%	$0.052
12	High Efficiency Air Conditioning	219	1.2%	458	40	0.2%	127,391	0.1%	2,547,827	0.1%	$34,350	0.2%	$0.013
13	Energy Conservation - Plug Load	1,271	6.8%	4,849	41	0.2%	359,698	0.3%	1,798,492	0.1%	$127,102	0.7%	$0.071
14	High Efficiency Motors	2	0.0%	60	8	0.0%	72,876	0.1%	1,093,136	0.1%	$5,100	0.0%	$0.005
15	Other	1	0.0%	2	0	0.0%	0	0.0%	0	0.0%	$425	0.0%	$0.000
16	Accounting	352	1.9%	0	0	0.0%	0	0.0%	0	0.0%	$374,851	2.0%	$0.000
	Total	**18,571**	**100.0%**	**4,949,962**	**20,726**	**100.0%**	**136,600,252**	**100.0%**	**1,766,585,174**	**100.0%**	**$19,101,689**	**100.0%**	**$0.011**

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

The Program's shift away from CFL's was significant in PY17. There were 3,958 total CFLs incentivized in PY17, which is less than 2% of the 304,248 CFLs incentivized in PY16. About a quarter of the lamps incentivized in PY17 were for hard-to-reach specialty CFL lamp replacements. The remaining three-quarters of CFL's were roll-over residential online-store purchases from PY16. For comparison, there were over 2,300,000 LED lamps incentivized in PY17 through prescriptive programs alone. **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
PY2017	164	3,794	3,958
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
PY2017	3,099	58,627	61,726
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
PY2017	19	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.

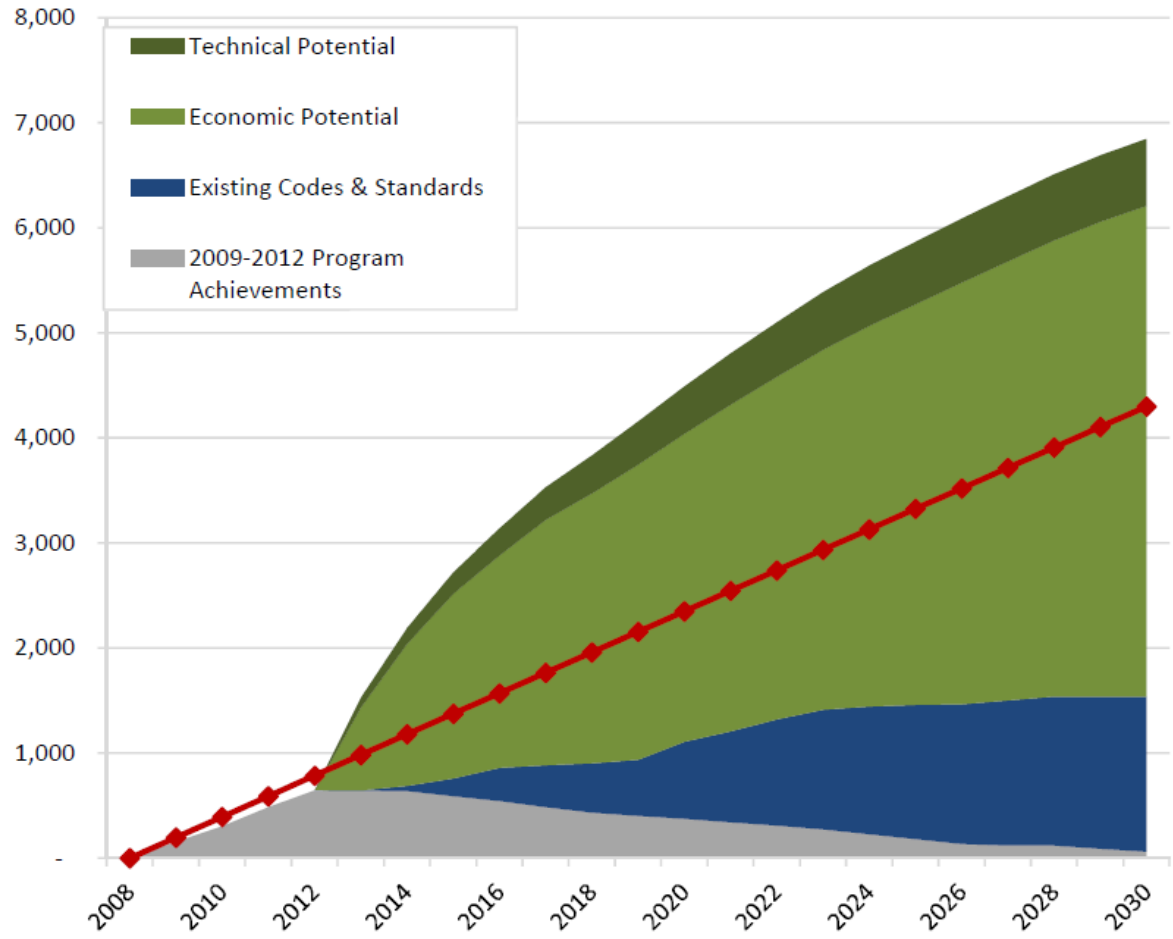
Key Findings

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 the while the EEPS goals are aggressive, it is likely they can be met cost-effectively.

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



Application of 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 ~27% of kWh sales. Therefore, approximately 73% 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 ~27% of kWh sales.

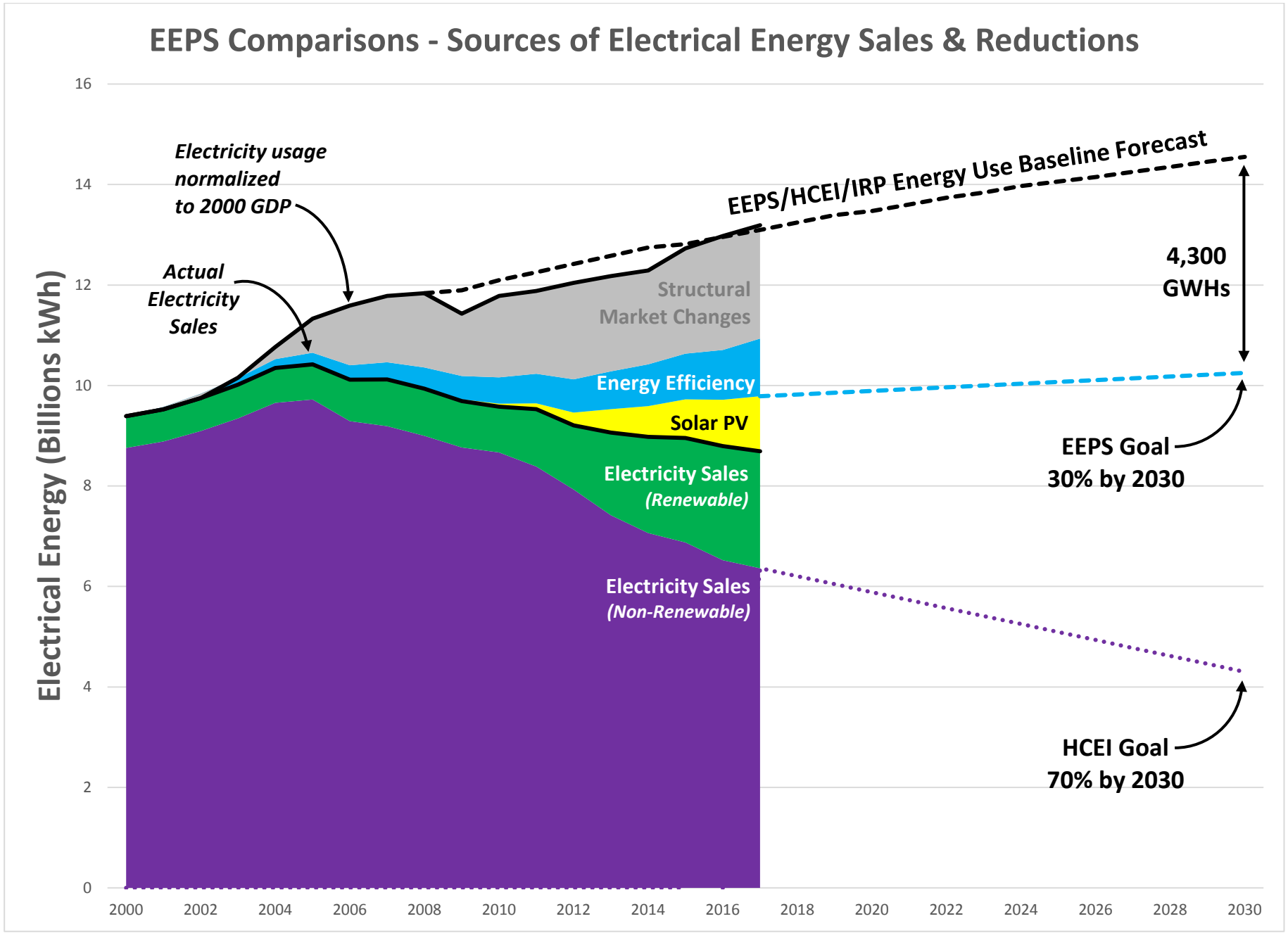
B. *Solar PV Production* (yellow area) – This line adds in the energy use that distributed PV systems are estimated to generate. In 2017, it is estimated that the PV systems generated 1,095 GWh[3].

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.

[3] Based on Hawaiian Electric Industries' 2017 Annual Report, which cited 695MW of installed PV; 4.8 sun hours and 0.9 conversion factor was assumed.

Figure 5
EEPS Goal and Tracking



Portfolio Impacts Relative to Load

Table 20, **Table 22**, and **Table 21** show the Program and Customer Level impacts as compared to PY17 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 21** comes from the HEI 10k report and is reported on calendar year.

For PY 17, customer level savings were equivalent to 1.78% of the 2017 annual energy sales and 1.3% of the peak demand for the utility customers.

Table 20
Energy Impacts vs. Sales

Island	PY 2017 kWh Sales*	Customer Level kWh Savings	% of Island Sales	% of Total Sales	Program Level kWh Savings	% of Island Sales	% of Total Sales
Hawai'i	1,055,846,872	18,669,260	1.77%	0.22%	16,671,117	1.58%	0.19%
Lāna'i	29,690,074	62,464	0.21%	0.001%	62,238	0.21%	0.001%
Maui	1,034,104,986	19,036,051	1.84%	0.22%	16,780,227	1.62%	0.19%
Moloka'i	28,411,084	502,889	1.77%	0.006%	533,142	1.88%	0.006%
O'ahu	6,494,439,426	115,416,718	1.78%	1.34%	102,553,529	1.58%	1.19%
Total	**8,642,492,442**	**153,687,381**		**1.78%**	**136,600,252**		**1.61%**

* DBEDT - Monthly Energy Trends - http://dbedt.hawaii.gov/economic/energy-trends-2/

Table 22
HECO Sales vs. Generated & Purchased

HECO Consolidated Operating Statistics*	kWh/Yr	%
Net Generated and Purchased	9,368,940,260	100.00%
Sales	8,642,492,442	92.25%
System Losses and Use	**726,447,818**	**7.75%**

*DBEDT Monthly Energy Trends

Table 21
Demand Impacts vs. Sales

Island	2017 kW Peak*	Customer Level kW Reduction	% of Island Peak	% of Total Peak	Program Level kW Reduction	% of Island Peak	% of Total Peak
Hawai'i	190,500	3,351	1.76%	0.21%	3,078	1.62%	0.19%
Lāna'i	5,400	15	0.28%	0.00%	16	0.30%	0.001%
Maui	198,500	2,950	1.49%	0.19%	2,685	1.35%	0.17%
Moloka'i	5,900	102	1.73%	0.01%	111	1.88%	0.007%
O'ahu	1,184,000	16,141	1.36%	1.02%	14,837	1.25%	0.94%
Total	**1,584,300**	**22,560**		**1.42%**	**20,726**		**1.31%**

* HEI 2017 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.
PY17	2017	1	1.00	$ -	$ 0.171	$ -	$ 0.1708	$ -	$ 0.1708
PY18	2018	2	0.94	$ -	$ 0.176	$ -	$ 0.1660	$ -	$ 0.3368
PY19	2019	3	0.89	$ -	$ 0.181	$ -	$ 0.1613	$ -	$ 0.4980
PY20	2020	4	0.84	$ 904.0	$ 0.187	$ 759	$ 0.1567	$ 759	$ 0.6548
PY21	2021	5	0.79	$ 986.0	$ 0.192	$ 781	$ 0.1523	$ 1,540	$ 0.8070
PY22	2022	6	0.75	$ 856.0	$ 0.198	$ 640	$ 0.1480	$ 2,180	$ 0.9550
PY23	2023	7	0.70	$ 750.0	$ 0.204	$ 529	$ 0.1438	$ 2,708	$ 1.0988
PY24	2024	8	0.67	$ 663.0	$ 0.210	$ 441	$ 0.1397	$ 3,149	$ 1.2385
PY25	2025	9	0.63	$ 590.0	$ 0.216	$ 370	$ 0.1358	$ 3,519	$ 1.3742
PY26	2026	10	0.59	$ 527.0	$ 0.223	$ 312	$ 0.1319	$ 3,831	$ 1.5061
PY27	2027	11	0.56	$ 474.0	$ 0.230	$ 265	$ 0.1282	$ 4,096	$ 1.6343
PY28	2028	12	0.53	$ 1,020.0	$ 0.236	$ 537	$ 0.1246	$ 4,633	$ 1.7589
PY29	2029	13	0.50	$ 1,066.0	$ 0.244	$ 530	$ 0.1210	$ 5,163	$ 1.8799
PY30	2030	14	0.47	$ 964.0	$ 0.251	$ 452	$ 0.1176	$ 5,615	$ 1.9975
PY31	2031	15	0.44	$ 875.0	$ 0.258	$ 387	$ 0.1143	$ 6,002	$ 2.1118
PY32	2032	16	0.42	$ 795.0	$ 0.266	$ 332	$ 0.1110	$ 6,334	$ 2.2228
PY33	2033	17	0.39	$ 724.0	$ 0.274	$ 285	$ 0.1079	$ 6,619	$ 2.3307
PY34	2034	18	0.37	$ -	$ 0.282	$ -	$ 0.1048	$ 6,619	$ 2.4355
PY35	2035	19	0.35	$ -	$ 0.291	$ -	$ 0.1019	$ 6,619	$ 2.5374
PY36	2036	20	0.33	$ -	$ 0.300	$ -	$ 0.0990	$ 6,619	$ 2.6364
PY37	2037	21	0.31	$ -	$ 0.308	$ -	$ 0.0962	$ 6,619	$ 2.7326
PY38	2038	22	0.29	$ -	$ 0.318	$ -	$ 0.0935	$ 6,619	$ 2.8261
PY39	2039	23	0.28	$ -	$ 0.327	$ -	$ 0.0908	$ 6,619	$ 2.9169
PY40	2040	24	0.26	$ -	$ 0.337	$ -	$ 0.0883	$ 6,619	$ 3.0051
PY41	2041	25	0.25	$ -	$ 0.347	$ -	$ 0.0858	$ 6,619	$ 3.0909

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

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 $ 333,848,273. **Table 23** shows the measures and their relative contributions.

The top three measure categories, shown in **Table 23**, provided 90% 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 $221,397,090 (66.3%).
- *Customized Projects* – The second measure to offer significant contribution at $58,546,347 (17.5%) were customized projects.
- *High-Efficiency HVAC* – The third largest measure contributing to the TRB at $19,217,992 (5.8%) 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 62.1% of the TRB value. They are LED Lighting, LED Linear, and Custom Lighting.

- *LED Lighting* – The largest contributor to the TRB at $117,355,679 (35.2%).
- *LED Linear* – The second measure to offer significant contribution at $65,313,051 (19.6%) were customized projects.
- *Custom Lighting* - The third largest measure contributing to the TRB at $24,674,325 (7.4%).

The net TRB of $333,848,273 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.

PY17 Program Savings were achieved with an estimated TRC of $163,585,578, as shown in **Table 23**. The largest customer investments or TRC were in the categories of Customized Project Measures at $70,448,233 (43.1%), followed by High-Efficiency Lighting at $57,809,828 (35.3%), and High-Efficiency HVAC at $15,345,881 (9.4%). 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 2.0 indicates that society is getting a 2x return (or 200%) 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 Custom at $33,776,807 (20.6%), followed by LED Lighting at $26,782,536 (16.4%) and LED Linear at $25,376,300 (15.5%).

Table 23
Measure Portfolio Total Resource Benefit and Costs (TRB & TRC)
sorted by Program Energy kWh-Life

Category	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	%			$	%	$	%	$	%
High Efficiency Lighting	9,008	43.5%	80,058,338	58.6%	1,189,850,812	67.4%	14.9	3.8	$221,397,090	66.3%	$57,809,828	35.3%	$8,620,807	45.1%
Customized Project Measures	3,600	17.4%	24,563,577	18.0%	309,625,448	17.5%	12.6	0.8	$58,546,347	17.5%	$70,448,233	43.1%	$4,346,843	22.8%
High Efficiency HVAC	1,235	6.0%	6,595,866	4.8%	95,312,275	5.4%	14.5	1.3	$19,217,992	5.8%	$15,345,881	9.4%	$1,509,981	7.9%
High Efficiency Water Heating	910	4.4%	3,889,851	2.8%	64,813,887	3.7%	16.7	1.4	$14,266,337	4.3%	$9,854,469	6.0%	$1,339,888	7.0%
High Efficiency Appliances	197	0.9%	3,485,791	2.6%	47,768,370	2.7%	13.7	1.5	$7,840,833	2.3%	$5,192,533	3.2%	$751,725	3.9%
Commercial Kitchen	259	1.3%	1,534,192	1.1%	22,849,400	1.3%	14.9	4.8	$4,769,480	1.4%	$986,382	0.6%	$367,950	1.9%
Energy Awareness, Measurement and Control Systems	4,608	22.2%	13,867,282	10.2%	14,384,324	0.8%	1.0	1.9	$2,487,522	0.7%	$1,288,304	0.8%	$1,223,904	6.4%
High Efficiency Water Pumping	30	0.1%	396,881	0.3%	5,550,929	0.3%	14.0	2.1	$970,912	0.3%	$457,350	0.3%	$64,145	0.3%
Consumer Electronics	85	0.4%	745,567	0.5%	4,536,411	0.3%	6.1	0.8	$908,721	0.3%	$1,189,551	0.7%	$126,387	0.7%
Building Envelope Improvements	88	0.4%	387,829	0.3%	3,878,289	0.2%	10.0	2.5	$920,315	0.3%	$366,642	0.2%	$73,339	0.4%
Energy Conservation - Hot Water	618	3.0%	515,115	0.4%	2,575,574	0.1%	5.0	8.8	$1,366,836	0.4%	$156,140	0.1%	$134,891	0.7%
High Efficiency Air Conditioning	40	0.2%	127,391	0.1%	2,547,827	0.1%	20.0	11.0	$602,092	0.2%	$54,960	0.0%	$34,350	0.2%
Energy Conservation - Plug Load	41	0.2%	359,698	0.3%	1,798,492	0.1%	5.0	2.8	$352,769	0.1%	$127,102	0.1%	$127,102	0.7%
High Efficiency Motors	8	0.0%	72,876	0.1%	1,093,136	0.1%	15.0	16.6	$201,027	0.1%	$12,120	0.0%	$5,100	0.0%
Other	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$0	0.0%	$425	0.0%
Accounting	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$296,081	0.2%	$374,851	2.0%
Total	**20,726**	**100.0%**	**136,600,252**	**100.0%**	**1,766,585,174**	**100.0%**	**12.9**	**2.0**	**$333,848,273**	**100.0%**	**$163,585,578**	**100.0%**	**$19,101,689**	**100.0%**

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

PY2017 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
Honolulu	Oʻahu	6,626,967,777	75.4%	63,803,191	80.1%	1.0%	38,750,337	68.1%	0.6%	102,553,529	75.1%	1.5%
Hawaiʻi	Hawaiʻi	1,059,047,406	12.0%	7,037,290	8.8%	0.7%	9,633,826	16.9%	0.9%	16,671,117	12.2%	1.6%
Maui	Maui	1,047,422,198	11.9%	8,798,688	11.0%	0.8%	7,981,539	14.0%	0.8%	16,780,227	12.3%	1.6%
Maui	Lānaʻi	30,403,223	0.3%	17,348	0.0%	0.1%	44,889	0.1%	0.1%	62,238	0.0%	0.2%
Maui	Molokaʻi	28,141,370	0.3%	43,664	0.1%	0.2%	489,478	0.9%	1.7%	533,142	0.4%	1.9%
Total		**8,791,981,974**	**100.0%**	**79,700,182**	**100.0%**	**0.9%**	**56,900,070**	**100.0%**	**0.6%**	**136,600,252**	**100.0%**	**1.6%**

PY2017 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
Honolulu	Oʻahu	6,626,967,777	75.4%	73,876,517	79.9%	1.1%	41,540,201	67.9%	0.6%	115,416,718	75.1%	1.7%
Hawaiʻi	Hawaiʻi	1,059,047,406	12.0%	8,176,037	8.8%	0.8%	10,493,222	17.1%	1.0%	18,669,260	12.1%	1.8%
Maui	Maui	1,047,422,198	11.9%	10,341,924	11.2%	1.0%	8,694,127	14.2%	0.8%	19,036,051	12.4%	1.8%
Maui	Lānaʻi	30,403,223	0.3%	21,036	0.0%	0.1%	41,428	0.1%	0.1%	62,464	0.0%	0.2%
Maui	Molokaʻi	28,141,370	0.3%	52,945	0.1%	0.2%	449,943	0.7%	1.6%	502,889	0.3%	1.8%
Total		**8,791,981,974**	**100.0%**	**92,468,459**	**100.0%**	**1.1%**	**61,218,922**	**100.0%**	**0.7%**	**153,687,381**	**100.0%**	**1.7%**

* 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 41.2%. The next highest incentive recipient rate schedule is "J" with 23.5%. Schedule "J" customers are General Service Demand users with greater than 5,000 kWh and less than 300 kW per month. The third highest incentive recipient rate schedule was "P" with 17.7%. 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: 73.4% of incentive funds on Oʻahu, 12.7% on Hawaiʻi, 12.7% on Maui, < 0.03% on Lānaʻi and 1.2% on Molokaʻi as shown in **Table 25**.

Table 25 Island Equity Incentives by Rate Schedule									
Island	**R**	**G**	**J**	**P**	**DS**	**F**	**Other**	**Total**	**%**
Oʻahu	$5,284,688	$1,235,238	$3,536,844	$2,442,430	$841,255	$685,220	$1,542	$14,027,216	73.4%
Hawaiʻi Island	$1,345,568	$337,313	$488,021	$199,313	$0	$56,457	$0	$2,426,672	12.7%
Maui	$1,018,779	$207,540	$459,519	$732,358	$0	$0	$0	$2,418,195	12.7%
Lānaʻi	$3,283	$0	$1,100	$0	$0	$0	$0	$4,383	0.0%
Molokaʻi	$218,807	$30	$6,385	$0	$0	$0	$0	$225,222	1.2%
Total	**$7,871,125**	**$1,780,120**	**$4,491,869**	**$3,374,101**	**$841,255**	**$741,677**	**$1,542**	**$19,101,689**	**100.0%**
Percent	**41.2%**	**9.3%**	**23.5%**	**17.7%**	**4.4%**	**3.9%**	**0.0%**	**100.0%**	

*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: 75.1% in Honolulu, 12.2% in Hawaiʻi and 12.3% in Maui counties.

Table 26 Island Equity Energy Savings by Program Budget Category							
Program	**Oahu**	**Hawaiʻi Island**	**Maui**	**Molokaʻi**	**Lānaʻi**	**Total**	**%**
BEEM	34,818,235	4,147,897	5,953,795	43,664	17,348	44,980,939	32.9%
CBEEM	19,893,267	1,434,613	1,732,625	0	0	23,060,505	16.9%
BESM	6,149	0	0	0	0	6,149	0.0%
BHTR	9,085,541	1,454,780	1,112,268	0	0	11,652,589	8.5%
Business Programs	**63,803,191**	**7,037,290**	**8,798,688**	**43,664**	**17,348**	**79,700,182**	**58.3%**
REEM	36,724,732	9,179,298	7,847,362	75,610	44,889	53,871,892	39.4%
CREEM	51,057	0	0	0	0	51,057	0.0%
RESM	1,239,661	69,261	67,781	0	0	1,376,703	1.0%
RHTR	734,887	385,267	66,395	413,868	0	1,600,417	1.2%
Residential Programs	**38,750,337**	**9,633,826**	**7,981,539**	**489,478**	**44,889**	**56,900,070**	**41.7%**
Total	**102,553,529**	**16,671,117**	**16,780,227**	**533,142**	**62,238**	**136,600,252**	**100.0%**
%	**75.1%**	**12.2%**	**12.3%**	**0.4%**	**0.0%**	**100.0%**	

Table 27 shows island equity by incentive dollars spent. The actual incentive spending received by each island is broken down as follows: 73.4% in Honolulu, 12.7% in Hawai'i and 13.9% in Maui counties.

Table 27
Island Equity Incentives by Program Budget Category

Program	Oahu	Hawai'i Island	Maui	Moloka'i	Lāna'i	Total	%
BEEM	$3,023,502	$457,799	$606,244	$6,415	$1,100	$4,095,060	21.4%
CBEEM	$3,277,546	$245,295	$503,917	$0	$0	$4,026,758	21.1%
BESM	$1,350	$0	$0	$0	$0	$1,350	0.0%
BHTR	$2,423,406	$393,835	$288,471	$0	$0	$3,105,712	16.3%
Business Programs	**$8,725,804**	**$1,096,929**	**$1,398,632**	**$6,415**	**$1,100**	**$11,228,879**	**58.8%**
REEM	$4,513,915	$1,067,625	$962,944	$7,631	$3,283	$6,555,399	34.3%
CREEM	$20,350	$0	$0	$0	$0	$20,350	0.1%
RESM	$363,175	$26,750	$25,975	$0	$0	$415,900	2.2%
RHTR	$403,972	$235,368	$30,644	$211,176	$0	$881,161	4.6%
Residential Programs	**$5,301,413**	**$1,329,743**	**$1,019,564**	**$218,807**	**$3,283**	**$7,872,809**	**41.2%**
Total	**$14,027,216**	**$2,426,672**	**$2,418,195**	**$225,222**	**$4,383**	**$19,101,689**	**100.0%**
%	**73.4%**	**12.7%**	**12.7%**	**1.2%**	**0.0%**	**100.0%**	

Overall Impacts

For PY17, Hawai'i Energy's Business program achieved savings of 79,700,182 kWh (first year), 1,134,730,129 lifetime kWh and 9,514 kW with $11,228,879 in incentives. In relative terms, 58.8% of Hawai'i Energy's incentives ($11,228,879 out of $19,101,689 of direct incentives) captured 58.3% of kWh (first year), 64.2% of lifetime kWh and 45.9% of kW demand first year savings, respectively, with a Total Resource Benefit to Cost ratio of 1.9.

Table 28 provides a detailed breakdown by budget category. For PY17, 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

Program	Units	Program Demand		Program Energy First Year		Program Energy Lifetime		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit		Total Resource Cost		Incentives	
		kW	%	kWh	%	kWh	%			$	%	$	%	$	%
BEEM	620,081	4,481	47.1%	44,980,939	56.4%	684,150,941	60.3%	15.2	2.9	$122,909,030	58.7%	$42,319,422	36.3%	$4,095,060	36.5%
CBEEM	1,578	3,400	35.7%	23,060,505	28.9%	287,979,829	25.4%	12.5	0.8	$54,322,973	26.0%	$69,927,523	60.0%	$4,026,758	35.9%
BESM	18	1	0.0%	6,149	0.0%	6,149	0.0%	1.0	0.2	$1,051	0.0%	$5,400	0.0%	$1,350	0.0%
BHTR	69,759	1,631	17.1%	11,652,589	14.6%	162,593,209	14.3%	14.0	7.6	$31,977,410	15.3%	$4,220,364	3.6%	$3,105,712	27.7%
Total	**691,436**	**9,514**	**100.0%**	**79,700,182**	**100.0%**	**1,134,730,129**	**100.0%**	**14.2**	**1.8**	**$209,210,465**	**100.0%**	**$116,472,709**	**100.0%**	**$11,228,879**	**100.0%**

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 PY17 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.

Small Business Direct Install Lighting (SBDIL)

The Small Business Direct Install Lighting (SBDIL) program continued to be an important element of the overall business portfolio, and specifically, of hard to reach efforts. In PY17 769 small businesses and restaurants had their lamps retrofitted in the SBDIL Program. This will result in the customers saving 123,083,661 kWh over the life of the lighting system. Hawai'i Energy provided $2,479,694 of retrofit costs for SBDIL participants, an investment that will generate over $31.7 M in lifetime cost savings for these businesses.

Midstream Program

Originally launched in PY14, the midstream commercial lighting program or *Lighting Distributor Instant Rebate* continued to flourish in PY17, albeit at a slightly slower pace than in PY16. The Program provided incentive funding to local and national lighting distributors on 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 PY17, the Program had twenty two active participating lighting distributors, who advanced $1,422,858 in Hawai'i Energy incentives for energy-efficient lighting products that generated 28,191,891 kWh in program level energy savings and 2,077 kW in program level demand savings. The program stabilized in growth and continues to be one of Hawai'i Energy's most successful and cost-effective programs.

Overall Expenditures

Given its constrained budget for PY17, 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) had only limited activity in PY17 with most of the offering placed on hold for the entire year. See **Table 29** for the detailed expenditures.

Table 29
Business Program Expenditures

	Total Expenditures	PY17 Budget (R6)	Percent Spent	Unspent	Percent Unspent
Business Programs					
Operations and Management					
BEEM	$970,539.67	$990,000.00	98.03%	$19,460.33	1.97%
CBEEM	$641,461.13	$680,000.00	94.33%	$38,538.87	5.67%
BESM	$44,911.03	$53,000.00	84.74%	$8,088.97	15.26%
BHTR	$450,705.92	$451,000.00	99.93%	$294.08	0.07%
Total Business Programs	$2,107,617.75	$2,174,000.00	96.95%	$66,382.25	3.05%
Business Evaluation	$181,399.77	$181,403.68	100.00%	$3.91	0.00%
Business Outreach	$337,515.44	$385,000.00	87.67%	$47,484.56	12.33%
Total Business Non-Incentives	**$2,626,532.96**	**$2,740,403.68**	**95.84%**	**$113,870.72**	**4.16%**
Business Incentives					
BEEM	$4,095,059.67	$4,095,191.11	100.00%	$131.44	0.00%
CBEEM	$4,026,757.89	$4,029,149.56	99.94%	$2,391.67	0.06%
BESM	$1,350.00	$3,500.00	38.57%	$2,150.00	61.43%
BHTR	$3,105,711.83	$3,106,697.44	99.97%	$985.61	0.03%
Subtotal Business Incentives	$11,228,879.39	$11,234,538.11	99.95%	$5,658.72	0.05%
Business Transformational	$1,002,196.55	$1,019,853.04	98.27%	$17,656.49	1.73%
Total Business Incentives	**$12,231,075.94**	**$12,254,391.15**	**99.81%**	**$23,315.21**	**0.19%**
Total Business Programs	**$14,857,608.90**	**$14,994,794.83**	**99.09%**	**$137,185.93**	**0.91%**

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 those on the front lines directly responsible for energy efficiency measures being sold, designed, financed, installed, commissioned and maintained. By working with them, the Program is successful in uncovering opportunities to collaborate and support trade allies that leverage resources to promote energy conservation and efficiency.

Through 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 our allies' engagement with our staff and the marketplace offers greater opportunities to transform the market. As shown in **Table 30**, approximately 81% of Customer Lifetime Savings achieved in PY17 were brought to the program through these allies. Over the years, Hawai'i Energy has taken a more strategic approach with these allies, including creating an Energy Insiders Rewards program to highlight the most active allies.

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

MK Kapolei Commons, one of O'ahu's most-trafficked west side shopping centers, completed an exterior lighting retrofit that included switching 1,000-watt metal halide lamps in 163 fixtures down to 285-watt LEDs. As lights at a shopping center are commonly on 12 hours per day, this retrofit is projected to save Kapolei Commons over $120,000 per month in energy costs. (Photo courtesy of Kapolei Commons)

Table 30 Business Project Sources				
Trade Allies	**Customer Level Demand Savings (kW)**	**Customer Level Energy Savings (kWh)**	**Customer Level Lifetime Energy Savings (kWh)**	**Customer Level Lifetime Energy Savings (%)**
The Light Bulb Source	520	6,170,456	91,845,289	6.2%
Grainger	237	3,174,563	47,198,877	3.2%
Alpha Electric Supply Inc.	227	3,065,067	45,877,414	3.1%
Opterra	204	2,820,023	42,300,350	2.9%
HD Supply Facilities Maintenance, Ltd	196	2,799,516	41,992,741	2.9%
Hawaiian Dredging	384	1,876,313	27,186,897	1.9%
Hawai'i PV Partners	212	2,124,223	25,932,731	1.8%
Dial Electric Supply	142	1,691,097	25,009,836	1.7%
Energy Industries	230	1,701,530	23,643,904	1.6%
Direct From Applicants	2,679	17,084,937	256,611,795	1.4%
Hawaii Energy Systems	271	1,855,701	30,041,089	1.1%
Graybar Electric Co.	946	12,970,927	193,936,325	0.9%
Remaining Allies	5,023	37,876,962	507,197,315	18.3%
Total	**11,271**	**95,211,314**	**1,358,774,564**	**47.0%**

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 PY17. 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 PY17, 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, greater levels of 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 PY17. This allowed Hawai'i Energy to reduce incentive levels for LEDs without significantly impacting customer participation. The end result was a combined contribution of all LED offerings, including directional, omnidirectional, linear tube and specialty LEDs achieving energy savings of 37,095,043 kWh this past year, or 82.5% of the total BEEM program energy savings.

High Efficiency HVAC

In PY17, tight budgets and a desire to optimize the cost-effectiveness of the overall portfolio resulted in a decrease in incentive levels for all high efficiency air conditioning units. However, even with the reduction in incentive levels, new chillers and chiller plant improvements such as variable frequency drives (VFDs) on chiller pumps, fans and air handling units, were still the second largest contributors to the success of the BEEM program. In PY17 Chillers and VFDs installed in HVAC systems produced energy savings of 3,418,314 kWh or 7.6% of the total BEEM program energy savings.

Operational Improvements

In PY17 Hawai'i Energy continued to improve the functionally 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 audit tool to submit lighting projects, the Program added the capability to use the tool on smart phones and tablets. This new feature, called RESPONSIVE, has all of the capabilities of the original AMPLIFY system, but is now more portable, allowing contractors to be more efficient and accurate in the field, and further easing the application process.

Impacts

For PY17, the BEEM Program achieved savings of 44,280,939 kWh (first year) and 4,481 kW savings with $4,095,060 in incentives. **Table 31** provides further details.

The Hawai'i campus of Brigham Young University in Lā'ie, O'ahu was awarded a $190,582 incentive toward the replacement and consolidation of four 400-ton and two 800-ton chillers. The new chillers are programmed to run with optimal effectiveness to cool all classrooms and office buildings on its campus that hosts approximately 2,500 students from Hawai'i and across the world. From this upgrade, the university is expected to save $262,000 and 1.4 million kWh per year.

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 Linear	468,402	1,551	34.6%	19,194,719	42.7%	287,920,778	42.1%	15.0	2.1	$49,871,679	40.6%	$23,420,100	55.3%	$1,290,026	31.5%
LED Lighting	38,123	484	10.8%	6,465,895	14.4%	96,988,418	14.2%	15.0	9.4	$16,567,785	13.5%	$1,769,630	4.2%	$227,495	5.6%
LED Omni Directional	90,899	423	9.4%	5,775,681	12.8%	86,635,222	12.7%	15.0	4.6	$14,744,310	12.0%	$3,181,465	7.5%	$195,524	4.8%
LED Specialty	4,055	389	8.7%	3,912,635	8.7%	58,689,520	8.6%	15.0	13.3	$10,604,447	8.6%	$797,250	1.9%	$491,450	12.0%
Chillers	35	386	8.6%	2,364,431	5.3%	47,288,615	6.9%	20.0	1.0	$8,792,650	7.2%	$8,732,188	20.6%	$337,446	8.2%
LED Exit Signs	1,795	199	4.4%	1,746,114	3.9%	26,191,711	3.8%	15.0	23.9	$4,884,547	4.0%	$204,720	0.5%	$122,805	3.0%
Split Systems: 15% Better Than Code	656	116	2.6%	1,022,389	2.3%	15,335,830	2.2%	15.0	5.1	$2,856,084	2.3%	$564,072	1.3%	$399,538	9.8%
VFD Pump for Chilled Water / Condenser Water	32	263	5.9%	967,749	2.2%	14,516,240	2.1%	15.0	8.2	$3,621,572	2.9%	$442,000	1.0%	$104,000	2.5%
Custom - EMS TBD	969	80	1.8%	602,614	1.3%	9,039,205	1.3%	15.0	6.0	$1,755,655	1.4%	$290,700	0.7%	$90,075	2.2%
Solar Water Heating	5	235	5.3%	412,621	0.9%	8,252,429	1.2%	20.0	80.2	$2,646,905	2.2%	$33,000	0.1%	$130,622	3.2%
Split Systems: VRF	145	39	0.9%	358,846	0.8%	5,382,683	0.8%	15.0	1.3	$990,636	0.8%	$744,800	1.8%	$128,819	3.1%
Package Units: 15% Better Than Code	506	37	0.8%	291,756	0.6%	4,376,339	0.6%	15.0	3.0	$836,232	0.7%	$275,323	0.7%	$189,929	4.6%
Domestic Water Booster Packages	10	27	0.6%	278,865	0.6%	4,182,982	0.6%	15.0	2.3	$748,532	0.6%	$324,000	0.8%	$34,880	0.9%
Fluorescent T12 to T8 Low Wattage	4,508	34	0.8%	290,920	0.6%	4,072,881	0.6%	14.0	2.9	$771,527	0.6%	$270,480	0.6%	$9,016	0.2%
Window Film	0	88	2.0%	387,829	0.9%	3,878,289	0.6%	10.0	2.5	$920,315	0.7%	$366,642	0.9%	$73,339	1.8%
Fluorescent Delamping	1,865	18	0.4%	175,525	0.4%	2,457,344	0.4%	14.0	30.3	$451,744	0.4%	$14,920	0.0%	$9,475	0.2%
Refrigerator w/ Trade In	155	5	0.1%	102,525	0.2%	1,435,344	0.2%	14.0	1.3	$231,113	0.2%	$183,600	0.4%	$22,650	0.6%
Fluorescent T8 to T8 Low Wattage	5,375	26	0.6%	99,873	0.2%	1,398,219	0.2%	14.0	1.1	$346,063	0.3%	$322,500	0.8%	$10,750	0.3%
VFD - AHU	19	30	0.7%	86,134	0.2%	1,292,005	0.2%	15.0	6.4	$359,476	0.3%	$56,426	0.1%	$8,900	0.2%
Fluorescent Delamping with Reflectors	686	7	0.1%	78,688	0.2%	1,101,627	0.2%	14.0	14.2	$194,379	0.2%	$13,720	0.0%	$6,860	0.2%
ECM Refrigeration	60	8	0.2%	72,876	0.2%	1,093,136	0.2%	15.0	16.6	$201,027	0.2%	$12,120	0.0%	$5,100	0.1%
Submetering (Condo)	184	13	0.3%	73,863	0.2%	590,906	0.1%	8.0	1.4	$132,297	0.1%	$92,000	0.2%	$27,600	0.7%

(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	%			$	%	$	%	$	%
VFD Pool Pumps	18	3	0.1%	38,554	0.1%	573,338	0.1%	14.9	5.1	$99,572	0.1%	$19,350	0.0%	$9,340	0.2%
Room Occupancy Sensors	1,236	7	0.2%	69,504	0.2%	556,033	0.1%	8.0	4.4	$108,530	0.1%	$24,720	0.1%	$24,720	0.6%
LED Refrigerated Case Lighting	288	10	0.2%	60,015	0.1%	300,074	0.0%	5.0	2.2	$64,191	0.1%	$28,623	0.1%	$22,825	0.6%
Heat Pump	3	1	0.0%	22,072	0.0%	220,717	0.0%	10.0	0.4	$35,953	0.0%	$91,040	0.2%	$1,837	0.0%
Rid-A-Fridge (Refrigerator)	18	1	0.0%	12,892	0.0%	180,486	0.0%	14.0	19.7	$28,636	0.0%	$1,450	0.0%	$1,450	0.0%
Package Units: VRF	6	1	0.0%	6,976	0.0%	104,645	0.0%	15.0	1.4	$21,928	0.0%	$16,100	0.0%	$2,300	0.1%
VRF Air Conditioners	5	1	0.0%	3,417	0.0%	30,757	0.0%	9.0	0.4	$8,001	0.0%	$20,354	0.0%	$750	0.0%
Rid-A-Fridge (Freezer)	3	0	0.0%	2,141	0.0%	29,972	0.0%	14.0	19.8	$4,755	0.0%	$240	0.0%	$240	0.0%
Window AC w/ Trade In	11	0	0.0%	1,816	0.0%	16,344	0.0%	9.0	0.8	$4,240	0.0%	$5,350	0.0%	$950	0.0%
Whole House Fan	3	0	0.0%	793	0.0%	15,858	0.0%	20.0	10.4	$3,748	0.0%	$360	0.0%	$225	0.0%
T12 to T8 Standard (2 foot lamps)	6	0	0.0%	214	0.0%	2,993	0.0%	14.0	2.8	$502	0.0%	$180	0.0%	$20	0.0%
Recycler App - Acct. Header Record	0	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$0	0.0%	$0	0.0%
Non-Qualifying Equipment	0	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$0	0.0%	$5,632	0.1%
Accounting	0	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$0	0.0%	$108,474	2.6%
Total	**620,081**	**4,481**	**100.0%**	**44,980,939**	**100.0 %**	**684,150,941**	**100.0 %**	**15.2**	**2.9**	**$122,909,030**	**100.0 %**	**$42,319,422**	**100.0 %**	**$4,095,060**	**100.0 %**

Expenditures

The original budget for the BEEM program as presented in Hawai'i Energy PY17 Annual Plan was $5,776,212, split between Operations at $990,000 and Incentives at $4,786,212 (see **Table 14**). Hawai'i Energy made several transfers between other program budgets until the final PY17 for the BEEM program was $5,085,191 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. See **Appendix B** for details.

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, 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® or DesignLights Consortium® and greatly increased the number and types of LED fixtures eligible to 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 exactly how much the incentive would be for each measure and ultimately participate in the program.

Adjustments from the Annual Plan

In the PY17 Annual Plan, Hawai'i Energy noted two significant multi-year energy projects with substantial incentives that were expected to be completed in the program year. These projects were an energy management system planned for military housing, and a replacement of the ultra violet lighting system at the Sand Island Wastewater Treatment plant. As with many very complex projects, the timing of these undertakings was delayed on the customer side, and the incentives were not paid in PY17. These projects are now planned for completion in PY18. The delayed completions did not adversely affect Program goals, as there was sufficient demand in the CBEEM program in PY17 to successfully meet targets. .

Impacts

For PY17, the CBEEM Program achieved savings of 23,060,505 kWh (first year) and 3,400 kW savings with $4,026,758 in incentives. **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	1,517	1,950	57.4%	12,986,767	56.3%	119,819,452	41.6%	9.2	2.0	$24,674,335	45.4%	$12,513,451	17.9%	$2,154,364	53.5%
Custom HVAC	12	570	16.8%	4,133,368	17.9%	84,236,537	29.3%	20.4	0.7	$13,861,375	25.5%	$20,024,437	28.6%	$880,674	21.9%
Custom	25	546	16.1%	3,502,197	15.2%	60,956,140	21.2%	17.4	0.3	$11,129,411	20.5%	$33,776,807	48.3%	$579,986	14.4%
Custom - High Efficiency Lighting	22	327	9.6%	2,403,306	10.4%	22,444,701	7.8%	9.3	1.3	$4,541,851	8.4%	$3,500,328	5.0%	$396,734	9.9%
Custom - High Efficiency HVAC	2	7	0.2%	34,867	0.2%	523,000	0.2%	15.0	1.0	$116,002	0.2%	$112,500	0.2%	$15,000	0.4%
Total	**1,578**	**3,400**	**100.0%**	**23,060,505**	**100.0%**	**287,979,829**	**100.0%**	**12.5**	**0.8**	**$54,322,973**	**100.0%**	**$69,927,523**	**100.0%**	**$4,026,758**	**100.0%**

Expenditures

The original budget for the CBEEM program as presented in Hawai'i Energy PY17 Annual Plan was $3,408,522, split between Operations at $740,000 and Incentives at $2,668,522, (see **Table 14**). Hawai'i Energy made several transfers between other program budgets until the final PY17 for the CBEEM program was $4,709,149 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. See **Appendix B** for details.

Business Energy Services & Maintenance (BESM)

Objective

The BESM 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 PY17 and the significant overdrive in the BEEM and CBEEM program, most of the offerings in the BESM program were put on hold for the year. There was some work completed on the SEM program which will be discussed below.

Accomplishments

Continuous Energy Improvement (CEI)/Strategic Energy Management (SEM)

In the PY17 Annual Plan CEI and SEM were discussed as separate initiatives, but in implementation during the year it was determined that the intent of both programs were essentially the same. Going forward, these initiatives will be combined under the term CEI.

The intent of the CEI program is to achieve energy savings through sustained organizational change (behavior and work processes) rather than discrete energy-saving projects. In PY17 Hawai'i Energy partnered with two customers to implement this initiative. This makes it both a resource acquisition and market transformation effort. For further discussion of the CEI program, see the Transformational Program section of this report.

Impacts

As discussed above, in PY17 the BESM program focused primarily on CEI, with little energy or demand savings (all AC Tune-up related). Hawai'i Energy expended $44,911 in operations supporting the CEI program. It is expected that the long term relationships with these customers will deliver energy and demand savings cost effectively in the future. **Table 33** provides a detailed breakout of BESM impacts.

Table 33
BESM 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	%			$	%	$	%	$	%
A/C Tune up	18	1	100.0%	6,149	100.0%	6,149	100.0%	1.0	0.2	$1,051	100.0%	$5,400	100.0%	$1,350	100.0%
Total	**18**	**1**	**100.0%**	**6,149**	**100.0%**	**6,149**	**100.0%**	**1.0**	**0.2**	**$1,051**	**100.0%**	**$5,400**	**100.0%**	**$1,350**	**100.0%**

Expenditures

The original budget for the BESM program as presented in Hawai'i Energy PY17Annual Plan was $258,500, split between Operations at $55,000 and Incentives at $203,500 (see **Table 14**). However almost all of this money was transferred to CBEEM and BHTR to cover the overdrive in those programs until the total BESM program budget was $56,500 as shown in **Appendix B**. By the end of the program year Hawai'i Energy spent $46,261 of the budget mostly in labor cost supporting the CEI program. See **Appendix B** for details.

Business Hard-To-Reach (BHTR)

Objective

The objective of the BHTR program is to help targeted geographies and demographics that have been traditionally underserved such as retail, restaurants, other small businesses and commercially metered multifamily properties[4]. 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
    - Kitchen Demand Controlled Ventilation
    - Special Initiatives

[4] For more information on the Multi-Family Direct Install (MFDI) program – also known as the *Energy Smart 4 Homes* program - see complete description in the Residential Hard To Reach (RHTR) section of this report.

- Traditional Retail
    - Kitchen Equipment
- Program Direct Install
    - Commercially Metered Multifamily Direct Install
    - Small Business Direct Install Lighting (SBDIL)

Accomplishments

In PY17, 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 customers in PY17. 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. It also 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 small businesses, perform audits and execute the retrofits for participants.

As discussed in the BEEM Operational Improvements section, but equally as important to the SBDIL contractors who use AMPLIFY, the Program added the capability to use the tool on smart phones and tablets. This new feature, called RESPONSIVE, has all of the capabilities of the original AMPLIFY system, but is now more portable, allowing contractors to be more efficient and accurate in the field, and further easing the application process.

This direct installation approach achieved customer level energy and demand savings of 123,083,661 kWh lifetime energy and 1,114 kW in PY17. At an average utility rate of $0.282 per kWh, this is a $28,048,700 in lifetime energy cost reduction for businesses!

Impacts

For PY17, the BHTR program achieved savings of 162,593,209 lifetime kWh and 1,631 kW savings with $3,105,712 in incentives. **Table 34** provides the detailed measures contributing to this program.

The ReStore is a primary fundraising source in Honolulu Habitat for Humanity's efforts to provide homes for O'ahu residents. As a nonprofit, the ReStore looks for ways to keep operating costs down while still maintaining an attractive retail space. Utilizing our network of Clean Energy Allies, Hawai'i Energy not only provided a significantly discounted retrofit, but provided a contractor who went above and beyond and helped ReStore dispose of some old, no-longer-usable CFL bulbs that they would have needed to pay $7,000 to do. Not only did this support a well-deserved business, the success of pairing a contractor to do a custom offering with a local nonprofit helped Hawai'i Energy launch a new nonprofit incentive program in PY18.

Table 34 BHTR Program Impacts															
Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh Life)		Average Measure Life	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%	(Years)		$	%	$	%	$	%
LED Linear	39,124	654	40.1%	5,887,415	50.5%	82,423,803	50.7%	14.0	7.9	$15,441,373	48.3%	$1,956,200	46.4%	$1,502,948	48.4%
LED Specialty	10,334	104	6.4%	775,939	6.7%	11,095,135	6.8%	14.3	15.3	$2,176,561	6.8%	$142,491	3.4%	$215,422	6.9%
LED Lighting	6,867	244	14.9%	1,321,846	11.3%	18,515,171	11.4%	14.0	12.9	$4,013,058	12.5%	$311,006	7.4%	$339,340	10.9%
LED Omni Directional	4,516	104	6.4%	716,249	6.1%	10,027,489	6.2%	14.0	12.7	$2,015,007	6.3%	$158,060	3.7%	$183,310	5.9%
Ladder Charge	2,451	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$17,206	0.4%	$17,206	0.6%
Advance Power Strips	1,853	15	0.9%	133,550	1.1%	667,748	0.4%	5.0	2.8	$130,925	0.4%	$47,321	1.1%	$47,321	1.5%
Custom - High Efficiency Lighting	1,669	119	7.3%	900,458	7.7%	12,606,413	7.8%	14.0	10.7	$2,467,719	7.7%	$230,010	5.5%	$230,010	7.4%
Faucet Aerator	1,149	20	1.2%	17,476	0.1%	87,378	0.1%	5.0	3.6	$44,769	0.1%	$12,609	0.3%	$10,366	0.3%
Showerhead	688	82	5.0%	85,672	0.7%	428,359	0.3%	5.0	9.5	$195,602	0.6%	$20,611	0.5%	$16,770	0.5%
Fluorescent T12 to T8 Low Wattage	381	1	0.0%	35,111	0.3%	491,549	0.3%	14.0	3.1	$74,385	0.2%	$23,707	0.6%	$10,086	0.3%
LED Refrigerated Case Lighting	304	22	1.4%	172,256	1.5%	2,411,588	1.5%	14.0	10.7	$469,057	1.5%	$43,979	1.0%	$43,979	1.4%
CFL Specialty	164	0	0.0%	3,099	0.0%	18,597	0.0%	6.0	3.6	$3,914	0.0%	$1,082	0.0%	$1,082	0.0%
LED Exit Signs	122	5	0.3%	63,633	0.5%	890,864	0.5%	14.0	43.1	$157,898	0.5%	$3,660	0.1%	$16,297	0.5%
T12 to T8 Standard (2 foot lamps)	63	1	0.1%	5,694	0.0%	79,716	0.0%	14.0	0.1	$17,664	0.1%	$158,299	3.8%	$1,477	0.0%
Kitchen Ventilation	35	253	15.5%	1,479,699	12.7%	22,195,480	13.7%	15.0	5.6	$4,644,713	14.5%	$831,150	19.7%	$357,525	11.5%
Reach-In Refrigerator Solid Door	20	2	0.1%	14,811	0.1%	177,737	0.1%	12.0	0.4	$33,925	0.1%	$83,000	2.0%	$6,600	0.2%
Reach-In Freezer Solid Door	9	2	0.1%	13,246	0.1%	158,956	0.1%	12.0	0.8	$30,315	0.1%	$39,000	0.9%	$2,375	0.1%
Ice Machine	5	1	0.0%	5,755	0.0%	69,065	0.0%	12.0	1.0	$13,184	0.0%	$12,645	0.3%	$500	0.0%
Reach-In Freezer Glass Door	3	2	0.1%	19,202	0.2%	230,422	0.1%	12.0	2.4	$43,955	0.1%	$18,011	0.4%	$550	0.0%
Reach-In Refrigerator Glass Door	2	0	0.0%	1,478	0.0%	17,740	0.0%	12.0	1.3	$3,387	0.0%	$2,576	0.1%	$400	0.0%
Accounting	0	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$106,449	2.5%	$100,857	3.2%
Accounting-Sales Tax	0	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$1,290	0.0%	$1,290	0.0%
Total	**69,759**	**1,631**	**100.0%**	**11,652,589**	**100.0%**	**162,593,209**	**100.0%**	**14.0**	**7.6**	**$31,977,410**	**100.0%**	**$4,220,364**	**100.0%**	**$3,105,712**	**100.0%**

Small Business Direct Install Lighting Program – Customer-Level Impacts

Customers participating in the SBDIL program are projected to save a combined $2,265,900 in operating expenses per year and $31,722,595 over the life of the lighting measures installed. This is money that they can invest into their businesses, driving more job growth and profitability. See **Table 35** for further details.

Table 35
SBDIL Customer Level Impacts by Island

Island	Customers	Measures	kW Reduction	kWh - First Year	kWh - Life	Program Cost ($/kWh 1st Yr)	Program Cost ($/kWh Lifetime)	Incentives	Annual Savings ($)	Lifetime Savings ($)	Average *G* Rate	Simple Payback (Years)	IRR
Hawaii Island	13	70	28	168,444	2,358,210	$0.280	$0.020	$47,248	$49,073	$687,021	$0.352	1.0	104%
Maui	13	99	32	202,823	2,839,525	$0.281	$0.020	$56,910	$54,345	$760,827	$0.305	1.0	95%
Oahu	173	1,193	347	2,106,352	29,488,923	$0.281	$0.020	$591,199	$461,635	$6,462,896	$0.258	1.3	78%
Restaurant Total	**199**	**1,362**	**406**	**2,477,618**	**34,686,658**	**$0.281**	**$0.020**	**$695,357**	**$565,053**	**$7,910,744**		**1.2**	**81%**
Hawaii Island	100	391	144	1,086,860	15,216,034	$0.283	$0.020	$307,361	$368,338	$5,156,731	$0.352	0.8	120%
Maui	80	477	120	776,934	10,877,071	$0.282	$0.020	$218,711	$230,528	$3,227,387	$0.305	0.9	105%
Oahu	390	2,776	443	4,450,278	62,303,898	$0.283	$0.020	$1,258,265	$1,101,981	$15,427,733	$0.258	1.1	88%
Small Business Total	**570**	**3,644**	**708**	**6,314,072**	**88,397,003**	**$0.283**	**$0.020**	**$1,784,336**	**$1,700,847**	**$23,811,851**		**1.0**	**95%**
Total	**769**	**5,006**	**1,114**	**8,791,690**	**123,083,661**	**$0.282**	**$0.020**	**$2,479,694**	**$2,265,900**	**$31,722,595**		**1.1**	**91%**

Expenditures

The original budget for the BHTR program as presented in Hawai'i Energy's PY17 Annual Plan was $3,401,577, split between Operations at $450,000 and Incentives at $2,951,577, (see **Table 14**). Hawai'i Energy made several transfers between other program budgets until the final PY17 budget for the BHTR program was $3,557,697 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.

Business Program Marketing Support

The marketing and communications strategy for the Business program focuses on building and maintaining strong relationships with existing and potential customers, as well as Clean Energy Allies. This strategy was developed with the understanding that business efficiency projects are often complex, high-cost, and require buy-in from (and thus, the persuasion of) multiple people. Strong, positive relationships and brand integrity are key to expediting decisions and getting projects off the ground. The primary goals of these efforts are to create a steady pipeline of project opportunities and position Hawai'i Energy as the trusted advisor that can connect business customers with those who can help them.

Relationship Building

The Program spent significant time building up its business case study library this year and using the studies to strengthen relationships with participating customers and Allies. Featuring successful projects through video or written testimonies allows the Program to: 1) add value to the companies by exposing their brand to a new audience; 2) market energy-saving possibilities to similar businesses; and 3) create long-lasting content for Hawai'i Energy's public-facing platforms. The Program highlighted more than 20 business customers and Allies this year in testimonials distributed through email, social media, Advisor presentations and trainings, and will continue to add to and utilize this tool in the coming year.

*The Program worked with the Chamber of Commerce of Hawai'i to host a public panel discussion on energy and resiliency titled "*A Resilient and Renewable Hawai'i: How Hawai'i's Mayors are Innovating to Create the Counties of the Future*," with City & County of Honolulu Mayor Kirk Caldwell, Maui Mayor Alan Arakawa, Mayor Bernard Carvalho of Kaua'i and Hawai'i County Director of the Department of Research & Development, Diane Ley. Each shared their unique perspectives on how to best make our island state more resilient in case of a sudden, destructive event.*

Hawai'i Energy also made valuable connections through its memberships in various professional organizations, leveraging the time spent networking and serving on committees into brand exposure and opportunities to bring energy issues in front of decision-making members of Hawai'i's business community. For example, the Honolulu Japanese Chamber of Commerce established a Climate Change Committee this year focused on educating members on climate change issues and initiatives affecting local businesses. Hawai'i Energy distributed a number of articles and event announcements through their regular email campaigns and continues to be an active contributor and resource provider.

Collaboration with Hawaiian Electric Company

Hawai'i Energy was also given the opportunity to collaborate on several projects with Hawaiian Electric Company this year targeted toward business customers. The first was a monthly contribution to the utility's "Smart Business Central" e-newsletter, which gets distributed to all business account holders in Hawai'i – a wide-reaching platform on which to provide efficiency content and promote Hawai'i Energy incentives. The second was a customer testimonial video produced by the Hawaiian Electric Company featuring The First Church of Christ, Scientist in Makiki, a Schedule G customer, who was referred to receive new lighting through the Small Business Direct Install program, by their key account manager. The video and corresponding article garnered local press coverage in Pacific Business News[5] and our two programs distributed the story through our respective online platforms.

[5] https://www.bizjournals.com/pacific/news/2018/05/22/hawaiian-electric-hawaii-energy-help-historic.html

Energy Advantage

The Small Business Direct Install Lighting program also received a small-scale branding refresh in PY17. Due to a drop in incentive rates, participating contractors requested marketing assistance from Hawai'i Energy to make it easier to pitch the no-longer-free offer. A new program name – *Energy Advantage* – was chosen with input from both Hawai'i Energy staff and the participating contractor group and was presented at the annual contractor meeting and AMPLIFY training. A new two-minute promotional video was also developed to give contractors a tool to easily explain the offer and introduce the Energy Advisors who can help them.

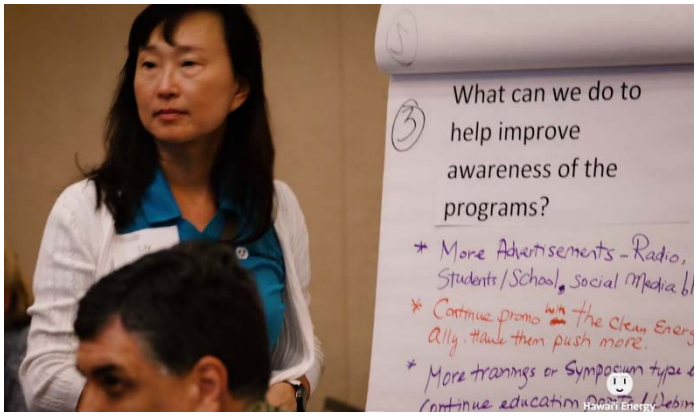
The Energy Advantage concept was preferred by contractors because of its simplicity and its themes of aspiration, competition and attractiveness. Creative partner Wall-to-Wall Studios helped refine the concept into a new logo, which was applied to the Hawai'i Energy website will be added to new collateral materials in PY18.

Innovation Symposium

The largest event for Hawai'i Energy this year was the Program's first-ever Innovation Symposium. A one-day conference modeled after a similar annual event hosted by sister program Ameren Illinois, the goal of the Innovation Symposium is to provide energy efficiency resources and business opportunities specifically for commercial customers.

Prior to the Symposium, there were very limited opportunities locally for commercial facility managers to receive intensive training on energy efficiency. Understanding this, Hawai'i Energy strategically designed sessions to offer both basic information for facility staff that may just be getting started, and more advanced content geared toward long-time engineers or contractors. Furthermore, the Program produced a trade show in conjunction with the sessions that featured over 20 Clean Energy Allies to help customers with project opportunities.

Session topics included lighting design, how to utilize energy data, energy audits, peak demand education and customer testimonials from local businesses. The sessions were taught by a variety of local and mainland-based experts. The conference also featured keynote addresses from Dawn Lippert of Elemental Excelerator and Jennifer Potter of Hawai'i Natural Energy Institute, as well as a closing session led by Hawai'i Energy staff that allowed participants to provide feedback on Hawai'i Energy's program design and offerings.



One of the most well-received facets of the Innovation Symposium was Hawai'i Energy's commitment to soliciting feedback from attendees on the event itself as well as yearly program offerings. The Program used an online interactive software tool called Mentimeter *to obtain this feedback in real-time during session as well as a small group harvesting session at the close of the event.*

The Program attained its first-year goal of 200 attendees and received very positive reviews overall, particularly on its ability and willingness to solicit and consider participant feedback in and outside of the Symposium. Moreover, the quality of event production and the Program's ability to execute smoothly was noticed by many attendees who commented that they could not believe that this was the inaugural year. This would not have been possible without a focus on cultivating strong business customer relationships, given that some of the largest in-kind contributors to the event were businesses that have participated in Hawai'i Energy's incentive programs.

The Innovation Symposium breakout sessions featured some of Hawai'i Energy's most proactive customers sharing best practices on implementing energy efficiency measures in their companies. Running concurrent to sessions was a trade show of Clean Energy Ally companies that were there to assist interested participants with executing projects right away.

Overall Impacts

Impacts

Program Year 2017 was another successful year for Hawai'i Energy's residential programs. The program achieved 56,900,070 first year kWh, 631,855,045 lifetime kWh, and 11,213 kW in demand with $7,872,809 in incentives. The residential programs accounted for 41% of Hawai'i Energy's total first year energy savings and 53% of the Program's total demand savings with 41% of the Program's incentives.

See **Table 36** for a summary of the residential program's impacts.

Table 36
Residential Program Impacts Summary

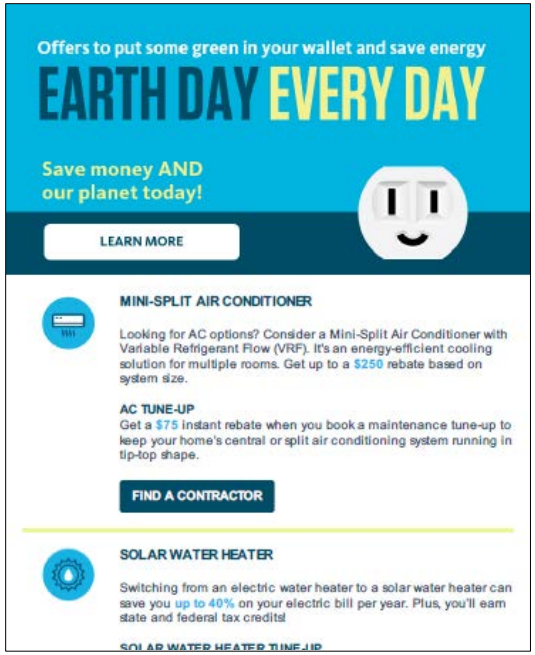
Program	Units	Program Demand (kW)		Program Energy First Year (kWh)		Program Energy Lifetime (kWh)		Average Measure Life	TRB/TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%	(Years)		$	%	$	%	$	%
REEM	4,218,776	10,508	93.7%	53,871,892	94.7%	610,535,140	96.6%	11.3	2.7	$120,035,331	96.3%	$44,715,393	94.9%	$6,555,399	83.3%
CREEM	3	7	0.1%	51,057	0.1%	251,411	0.0%	4.9	2.5	$50,995	0.0%	$20,350	0.0%	$20,350	0.3%
RESM	4,774	246	2.2%	1,376,703	2.4%	3,735,491	0.6%	2.7	0.5	$716,227	0.6%	$1,431,900	3.0%	$415,900	5.3%
RHTR	34,973	451	4.0%	1,600,417	2.8%	17,333,003	2.7%	10.8	4.1	$3,835,256	3.1%	$945,226	2.0%	$881,161	11.2%
Total	**4,258,526**	**11,213**	**100.0%**	**56,900,070**	**100.0%**	**631,855,045**	**100.0%**	**11.1**	**2.6**	**$124,637,808**	**100.0%**	**$47,112,868**	**100.0%**	**$7,872,809**	**100.0%**

Highlights

The success of Hawai'i Energy's residential programs in PY17 are a direct result of the continuing effort to enhance and streamline existing offerings while being responsive to the marketplace. New measures and innovative new programs were introduced via a focus on customer segmentation, leveraging program and customer data, and conforming program offerings to the perspective of the customer and Clean Energy Allies. The consumer channels *Hawai'i Energy 2.0* focused on were the following: **trade ally-installed measures, direct consumer purchases (retail and online), direct install in hard-to-reach sectors** and **program communicated education/behavioral programs.**

Residential A/C Tune-Up (Trade Ally)

Following the launch of the A/C Tune-Up program in PY16, the Program reviewed the offering with our participating contractors to determine how to streamline and improve the program further in PY17. Although large numbers of contractors had participated during the PY16 program year, the Program focused efforts on expanding our reach and engaging more of the HVAC contractor market. By the end of PY17, the Program saw a five-fold increase in participating AC programs contractors.



Marketing efforts for the Residential AC Tune-Up offer focused on direct mail and email (sample above) to a known HVAC customer segment to drive customer awareness of tune-up services and increase program participation.

New point-of-purchase signage was distributed throughout the year as a result of building strong relationships with retailers. Signage messaging was designed to be eye-catching and fun (in line with the Program's refreshed branding) and was timed with retail seasons.

Processes were simplified and changes included submitting work orders with a new fillable PDF form for the contractors, bulk work order submissions, and working with contractors to forecast their work in advance. A required orientation was made into a webinar with flexible scheduling, available to the contractors anytime to encourage greater contractor participation.

Direct Consumer Purchases

In PY17, high efficiency clothes washers and dryers, as well as heat pumps were added to the existing midstream program, launched in PY16 with the addition of consumer electronics (TVs and sound bars). Hawai'i Energy continues to offer midstream incentives to encourage retailers to stock and sell only the most efficient models on their floors. Moving rebates midstream streamlines the rebate process and helps reduce supply barriers in a market restricted by distributer and retailer stocking decisions.

The Program leveraged the existing relationships with retailers Sears® and Best Buy® to add clothes washers and clothes dryers, and was able to add Home Depot® in PY17 as a retail partner for these appliances. Lowes® was also added to our midstream program to include heat pump water heaters. By offering an incentive to retailers for each ENERGY STAR® qualified appliance or electronic product, Hawai'i Energy influenced retailer stocking and displays, and upstream purchase decisions by significantly improving profits and margins on these 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 selection of ENERGY STAR® products on retail floors.

Simultaneously, Hawai'i Energy inserted promotional materials in stores, directing customers to buy the most efficient products. By nudging customers and incentivizing retailers, Hawai'i Energy is able to influence both the supply- and demand-side of the consumer products market. Point of purchase (POP) signage placed on qualifying products in stores of participating retailers, displayed messaging consistent with ENERGY STAR® partner materials. Regular in-store signage updates coincided with new program launches and were scheduled to match retail seasonal holidays or changes.

In PY17, the Program saw an increase of ENERGY STAR® television incentive units from 6,000 in PY16 to over 9,000 in PY17, as well as an increase of over 1,000 ENERGY STAR® home audio systems in PY16 to over 1,600 units in PY17. 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. Combined with high efficiency washers and dryers, these ENERGY STAR® products added up to a savings of over 940,000 first year kWh over baseline models.

Direct Install and Bulk Purchase for Hard to Reach

Hawai'i Energy's hard-to-reach programs address the needs of underserved customer segments and communities that require additional resources and easier access to traditional program offerings.

PY17's holistic and consolidated approach to this sector included a "Three Ways to Save" marketing campaign for the following programs:

- Direct Installation of energy saving devices in multi-family properties
- Bulk purchase of appliances
- Energy saving workshops and outreach

The Energy Smart 4 Homes (ES4H) program provides multifamily customers direct access to no-cost energy efficiency solutions, such as high-efficiency lighting and water measures and energy management devices. In PY17, the ES4H program expanded its reach and teamed up with a channel partner to service properties in both the public and private sectors, punctuated by installations for the Hawai'i Public Housing Authority, City and County of Honolulu Department of Facility Maintenance, Department of Hawaiian Homelands, local property management companies, and single-owner walk-up properties. The Program reached over 5,900 multifamily households, saving customers over 1,800,000 kWh on their annual energy bills in the process.

Specific projects with partners were created and conducted to address a specified community need for direct intervention in the supply chain for high efficiency appliances. In partnership with Sustainable Moloka'i, Council for Native Hawaiian Advancement and the Hawai'i Sober Living and Recovery Center, Hawai'i Energy delivered high-efficiency appliances, water heating, and HVAC to residents who would be otherwise unable to realize these energy savings.

For more details on the program's accomplishments in this area, see "Residential Hard-To-Reach (RHTR)", as well as the "Behavior Modification and Community Workshops" section under Transformational Programs.

The above flyer was used to market the various Program offerings available to multifamily property owner and managers.

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

Continuing the PY16 strategy, Hawai'i Energy's Peer Group Comparison Report program was delivered to over 230,000 customers, reaching all eligible customers in Hawai'i, Honolulu, and Maui Counties. The program distributed personalized home energy reports (HERs), providing customers with insight into their electricity consumption, comparing it to that of similar households, and encouraging 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 reports garnered a strong response from customers, increasing energy savings and program awareness. Tips on the reports included taking advantage of rebates to secure additional savings for taking action and adopting change. These messages within the marketing sections of the reports were selected based on Hawai'i's seasonal needs and aligned with other campaigns such as direct mail.

Overall Expenditures

Expenditures

In PY17, the residential program distributed over 99% of its allocated incentive budget, based on final allocations. The year ended with a total of $7,872,809 in resource acquisition incentives spent, leaving a surplus of $69,101. The bulk of this surplus comes from the Residential Hard to Reach (RHTR) budget, due to projects carried over to PY18.

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, as evident with lighting. Most importantly, these expenditures led to the realization of residential energy and demand savings targets. The residential program savings met 96% of the original goal for first year kWh, 98% of the original goal for lifetime kWh, and 160% of the original goal for kW.

See **Table 37** for further details on final budgets and spending.

Table 37
Residential Program Expenditures

	Total Expenditures	PY17 Budget (R6)	Percent Spent	Unspent	Percent Unspent
Operations and Management					
REEM	$1,213,171	$1,215,000	99.85%	$1,829	0.15%
CREEM	$24,655	$25,000	98.62%	$345	1.38%
RESM	$34,618	$35,000	98.91%	$382	1.09%
RHTR	$259,526	$260,000	99.82%	$474	0.18%
Total Residential Programs	$1,531,971	$1,535,000	99.80%	$3,029	0.20%
Residential Evaluation	$99,756	$104,675	95.30%	$4,920	4.70%
Residential Outreach	$625,153	$690,000	90.60%	$64,847	9.40%
Total Residential Non-Incentives	**$2,256,880**	**$2,329,675**	**96.88%**	**$72,796**	**3.12%**
Residential Incentives					
REEM	$6,555,399	$6,560,936	99.92%	$5,537	0.08%
CREEM	$20,350	$28,000	72.68%	$7,650	27.32%
RESM	$415,900	$416,913	99.76%	$1,013	0.24%
RHTR	$881,161	$936,062	94.13%	$54,901	5.87%
Subtotal Residential Incentives	$7,872,809	$7,941,910	99.13%	$69,101	0.87%
Residential Transformational	$901,848	$919,556	98.07%	$17,708	1.93%
Total Residential Incentives	**$8,774,657**	**$8,861,466**	**99.02%**	**$86,809**	**0.98%**
Total Residential Programs	**$11,031,537**	**$11,191,141**	**98.57%**	**$159,605**	**1.43%**

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 was supported by almost 200 unique companies that played a role in driving energy efficiency in the residential market. The Clean Energy Allies program that was launched in PY14 continues to see an increase in participation, furthering our partnerships with the contractor community.

Highlights

Almost all of the Residential Program's success in PY17 came in partnership with a trade ally, and the highlights of these partnerships are too many to list. The continuing expansion of retail participation for the midstream programs was a success with the addition of clothes washers and dryers, and heat pumps through Sears, Best Buy and Lowe's. There are countless other relationships in the supply chain that broaden the reach of the Hawai'i Energy programs including Refrigerant Recycling, providing proper recycling of old, inefficient appliances, and Servco Home Appliance who assisted with our hard to reach bulk purchase programs on the neighbor islands. Every one of these allies is a critical piece of reaching island families while expanding program effectiveness, and these relationships are critical to ensure the importance of energy efficiency is exemplified throughout the product lifecycle.

Solar and HVAC contractor-based programs were promoted via direct mail, emails, outreach events, home energy reports, and print ads. Messaging in all trade based promotions placed emphasis on finding a participating contractor. Upgrades were also made to the Clean Energy Ally (CEA) web page which gave new access to trade allies, allowing them to update their business information and offerings featured on the website. Increased communication about new information and program offerings were met with higher engagement by contractors. Measurable data of this is seen in the increased e-newsletter open rates by residential trade allies. By end of year open rates reached 50%, more than double what is considered normal for industry standards. Contractors were also again offered cooperative advertising and ways to promote their businesses.

A full house at the O'ahu solar water heater contractor meeting showed that contractors are interested in and engaged with Hawai'i Energy's offerings.

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. As with previous years, Hawai'i Energy conducted its annual meeting for participating solar water heating contractors on O'ahu, Maui, and Hawai'i islands. In PY17, the meetings were jointly scheduled with A/C contractors at the same locations. These half-day sessions provided a forum to update contractors on program results, review offerings like Solar Water Heating and AC Tune-Up, network, and engage in honest and open dialogue aimed to improve the Program.

This year the agenda included all the Program's residential offerings and information on the Green Energy Market Securitization (GEMS) loan program for the purchase of select energy efficient appliances. A notable achievement in PY17 is the five-fold increase in program participation of AC contractors across all islands.

See **Figure 7** for a list of participating contractors that completed air conditioning installations or performed tune-ups in PY17, by County.

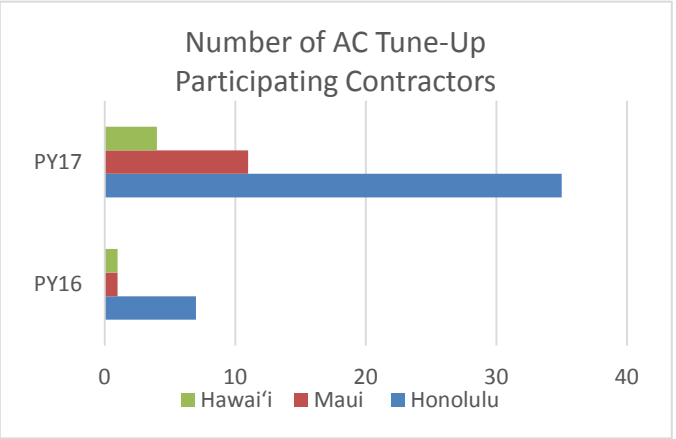


Figure 7
PY17 AC Tune-Up Participating Contractors

O'AHU

Absolute Air LLC	Aloha State Refrigeration and AC, Inc.	Hi-power Solar
AC General Air Conditioning, Inc.	Alternate Energy Inc.	Igloo AC
Adon Renewables	American Air Conditioning Inc.	Innovative air conditioning LLC
Advanced A/C Contracting	AMV Air Conditioning	Island Wind AC Inc
Air Conditioning Concepts	Aoyama Distribution, LLC.	KK Air Conditioning LLC
Air Conditioning Experts, LLC	B&B Air Conditioning	Progressive Air Conditioning
Air Conditioning Unlimited	C.S. Mechanical, Inc.	RMA Services LLC
Air Extreme	Cooling Tower AC, Inc.	RMI Mechanical, Inc.
Air Perfection	Craig's Air Conditioning	Solar Cool Hawaii
Air Source Air Conditioning	D & D Air Conditioning-Refrigeration LLC	Solar Services Hawaii
Aire Conditioner Shoppe	Direct Air Conditioning LLC	Standard Air
Airmasters Inc.	Greenpath Technologies, Inc	

MAUI	HAWAI'I
Air Conditioning of Maui, Inc	Hawai'i Air Conditioning
Alltemp Inc	Hilo Air A/C & Refrigeration LLC
Cooling Hawai'i	Hilo Mechanical Inc.
Dakine Air Conditioning & Heating	No Sweat Air Conditioning
Integrity Systems LLC	
P & S Refrigeration, LLC	
Pristine Air Conditioning	
South Shore Air Conditioning	
Sturdevant Air	
Sun King, Inc.	
Windward Air Conditioning, Inc	

See **Table 38** for details on residential project drivers and referrals.

Table 38 Residential Project Sources				
Trade Allies	**Customer Level Demand Savings (kW)**	**Customer Level Energy Savings (kWh First Year)**	**Customer Level Energy Savings (kWh - Life)**	**Customer Level Lifetime Energy Savings (%)**
Costco	3,615	25,416,458	381,090,701	49.7%
Home Depot	975	7,100,843	105,754,444	13.8%
City Mill	200	1,427,933	22,001,408	2.9%
Direct From Applicants	343	2,535,095	19,184,422	2.5%
Sears	70	1,075,120	14,406,625	1.9%
Opower	4,155	12,470,859	12,470,859	1.6%
Sam's Club	113	793,547	11,883,581	1.6%
Target	95	665,370	9,980,550	1.3%
Techniart	381	806,905	9,830,751	1.3%
Best Buy	105	1,129,872	9,627,780	1.3%
Poncho's Solar Service	104	465,280	9,298,834	1.2%
Walmart	85	596,408	8,946,113	1.2%
Hawaiian Solar & Plumbing	48	215,985	4,319,700	0.6%
Solar Help Hawaii	48	214,244	4,280,140	0.6%
Pono Home	151	389,107	4,072,460	0.5%
Servco	48	289,467	4,045,962	0.5%
Remaining Allies	1,051	5,626,430	83,924,038	5.4%
Total	**11,587**	**61,218,922**	**715,118,367**	**87.7%**

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 PY17. Below is each consumer channel and associated offering(s):

- Program Communication
  - Behavioral Energy Awareness / Responsibility
- Upstream and Midstream
  - High-Efficiency Appliances
  - High-Efficiency Electronics
  - High-Efficiency Lighting
  - Scheduling and Control Systems
- Traditional Retail
  - High-Efficiency Appliances
  - High-Efficiency HVAC (including Smart Thermostats)
  - High Efficiency Water Pumping
- Online Retail
  - Energy Savings Kits
- Trade Ally Provided
  - High-Efficiency HVAC
  - High-Efficiency Water Heating
  - Scheduling and Control Systems

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 32,591,782 of REEM's total 53,871,892 kWh. Meanwhile, the peer group comparison program contributed 13,793,419 first year kWh.

In terms of *lifetime* energy savings, upstream lighting dominates the portfolio as well, contributing over 80% of the portfolio's 610,535,140 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.

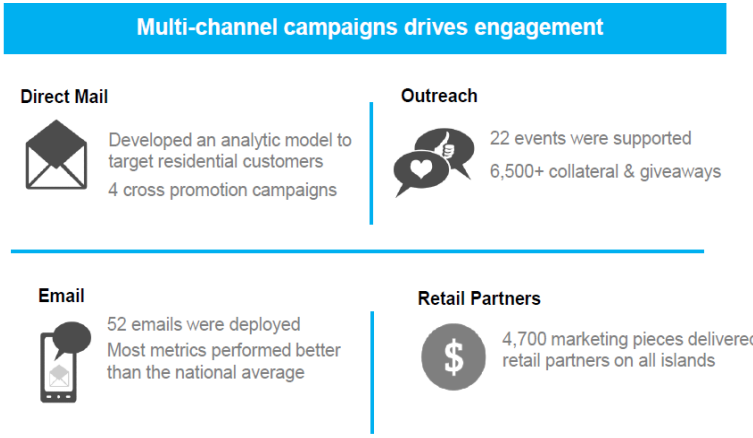
In addition to energy savings, the REEM portfolio contributed 10,508 kW in peak demand savings. Upstream lighting (44.1%) was the biggest contributor to demand savings. See **Table 39** for a full breakdown of REEM measures, incentives, and their impacts.

Table 39 REEM Program Impacts															
Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh Life)		Average Measure Life	TRB/TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%	(Years)		$	%	$	%	$	%
LED Lighting	1,656,069	4,629	44.1%	32,547,669	60.4%	488,215,033	80.0%	15.0	3.9	$96,561,115	80.4%	$24,661,961	55.2%	$3,619,768	55.2%
Solar Water Heating	1,301	523	5.0%	2,339,290	4.3%	46,785,806	7.7%	20.0	1.1	$9,634,150	8.0%	$8,586,600	19.2%	$649,700	9.9%
Refrigerator w/ Trade In	3,398	101	1.0%	2,446,145	4.5%	34,246,026	5.6%	14.0	1.3	$5,458,048	4.5%	$4,077,600	9.1%	$509,650	7.8%
Peer Group Comparison	2,535,018	4,595	43.7%	13,793,419	25.6%	13,793,419	2.3%	1.0	2.0	$2,355,225	2.0%	$1,196,304	2.7%	$1,196,304	18.2%
VRF Air Conditioners	791	166	1.6%	606,323	1.1%	5,456,908	0.9%	9.0	0.4	$1,419,416	1.2%	$3,552,769	7.9%	$123,750	1.9%
Rid-A-Fridge (Refrigerator)	486	14	0.1%	365,804	0.7%	5,121,257	0.8%	14.0	21.3	$812,554	0.7%	$38,170	0.1%	$38,520	0.6%
TV	9,403	83	0.8%	682,555	1.3%	4,095,333	0.7%	6.0	0.7	$831,765	0.7%	$1,116,606	2.5%	$107,955	1.6%
Advance Power Strips	4,688	36	0.3%	317,656	0.6%	3,414,480	0.6%	10.7	4.6	$603,911	0.5%	$132,113	0.3%	$119,865	1.8%
Whole House Fan	455	40	0.4%	126,598	0.2%	2,531,969	0.4%	20.0	11.0	$598,344	0.5%	$54,600	0.1%	$34,125	0.5%
Clothes Washer	837	22	0.2%	114,486	0.2%	1,602,797	0.3%	14.0	0.8	$351,872	0.3%	$460,350	1.0%	$27,605	0.4%
Heat Pump Water Heater	81	15	0.1%	116,101	0.2%	1,161,011	0.2%	10.0	1.6	$231,794	0.2%	$145,800	0.3%	$24,300	0.4%
Clothes Dryer	571	16	0.2%	82,705	0.2%	1,157,869	0.2%	14.0	0.9	$257,896	0.2%	$285,500	0.6%	$18,110	0.3%
VFD Pool Pumps	152	1	0.0%	79,461	0.1%	794,609	0.1%	10.0	1.1	$122,808	0.1%	$114,000	0.3%	$19,925	0.3%
Rid-A-Fridge (Freezer)	55	2	0.0%	41,439	0.1%	580,139	0.1%	14.0	23.7	$92,047	0.1%	$3,880	0.0%	$3,905	0.1%
Window AC w/ Trade In	366	17	0.2%	63,596	0.1%	572,365	0.1%	9.0	0.9	$148,498	0.1%	$173,930	0.4%	$27,630	0.4%
Soundbar	1,621	3	0.0%	63,011	0.1%	441,078	0.1%	7.0	1.1	$76,956	0.1%	$72,945	0.2%	$18,432	0.3%
CFL	3,026	6	0.1%	44,113	0.1%	264,677	0.0%	6.0	9.2	$55,948	0.0%	$6,052	0.0%	$1,362	0.0%
Solar Attic Fan	212	0	0.0%	29,278	0.1%	146,388	0.0%	5.0	0.7	$23,627	0.0%	$31,800	0.1%	$10,600	0.2%
Residential Custom	2	2	0.0%	5,770	0.0%	86,551	0.0%	15.0	11.4	$22,873	0.0%	$2,000	0.0%	$2,000	0.0%
LED Specialty	179	0	0.0%	3,505	0.0%	52,582	0.0%	15.0	6.8	$10,400	0.0%	$1,522	0.0%	$1,074	0.0%
Showerhead	40	3	0.0%	2,578	0.0%	12,890	0.0%	5.0	8.7	$6,297	0.0%	$720	0.0%	$280	0.0%
Kitchen Aerators	15	0	0.0%	391	0.0%	1,953	0.0%	5.0	6.8	$766	0.0%	$113	0.0%	$30	0.0%
Bathroom Aerators	9	233	2.2%	0	0.0%	1	0.0%	5.0	6,137.1	$359,020	0.3%	$59	0.0%	$9	0.0%
Other	1	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$0	0.0%	$500	0.0%
Recycler App - Acct. Header Record	0	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$0	0.0%	$0	0.0%
Total	**4,218,776**	**10,508**	**100.0%**	**53,871,892**	**100.0%**	**610,535,140**	**100.0%**	**11.3**	**2.7**	**$120,035,331**	**100.0%**	**$44,715,393**	**100.0%**	**$6,555,399**	**100.0%**

Expenditures

Based on final budget allocations, Hawai'i Energy distributed almost 100% 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. Marketing campaigns were launched throughout the year to ensure program goal attainment while educating customers with ways to save energy. Complimentary efforts for maximum exposure in all possible marketing venues included: paid online search campaigns, print advertisements in local newspapers, monthly email newsletters and bill inserts in the February utility electric bill mailing. Results showed high click through rates for search campaigns and almost one million in print ad audience through Star Advertiser and over 338,000 bill inserts distributed. **Figure 8** represents some the various campaigns deployed in PY17.

Figure 8
Residential Marketing Channels

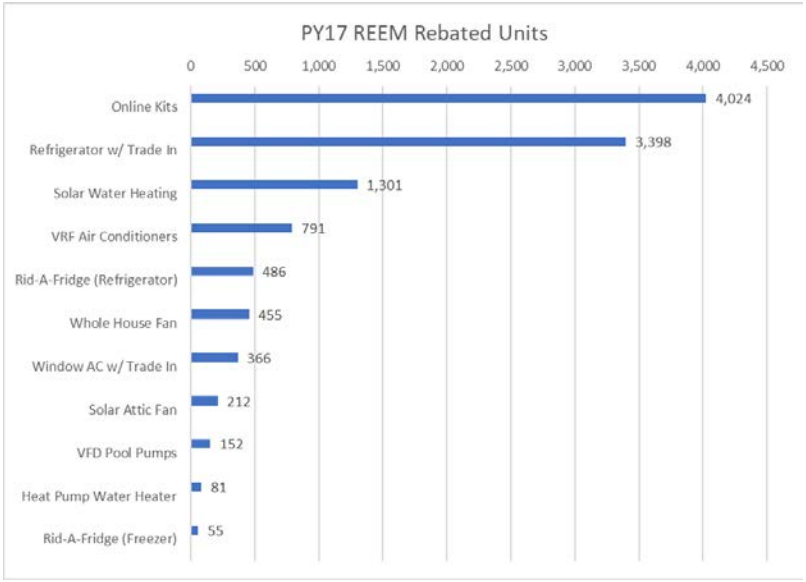


Throughout the year, community outreach events continued to be a great way for Hawai'i Energy to connect to families. From the annual Children & Youth Day at the Hawai'i State Capitol to the University of Hawai'i at Hilo Earth Day event, the Program was able to reach and connect to people with our messaging. Hawai'i Energy has continued to receive requests from groups to present educational content and promote energy awareness to their respective audiences.

The Building Industry Association (BIA) Home Show at the Neal Blaisdell Center continues to be a great venue to connect with thousands of residents looking for ways to upgrade their home and save energy at the same time. Various technologies and engagement activities were featured including 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.

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

Figure 9
Select REEM Participation



Accomplishments

Popular Offerings

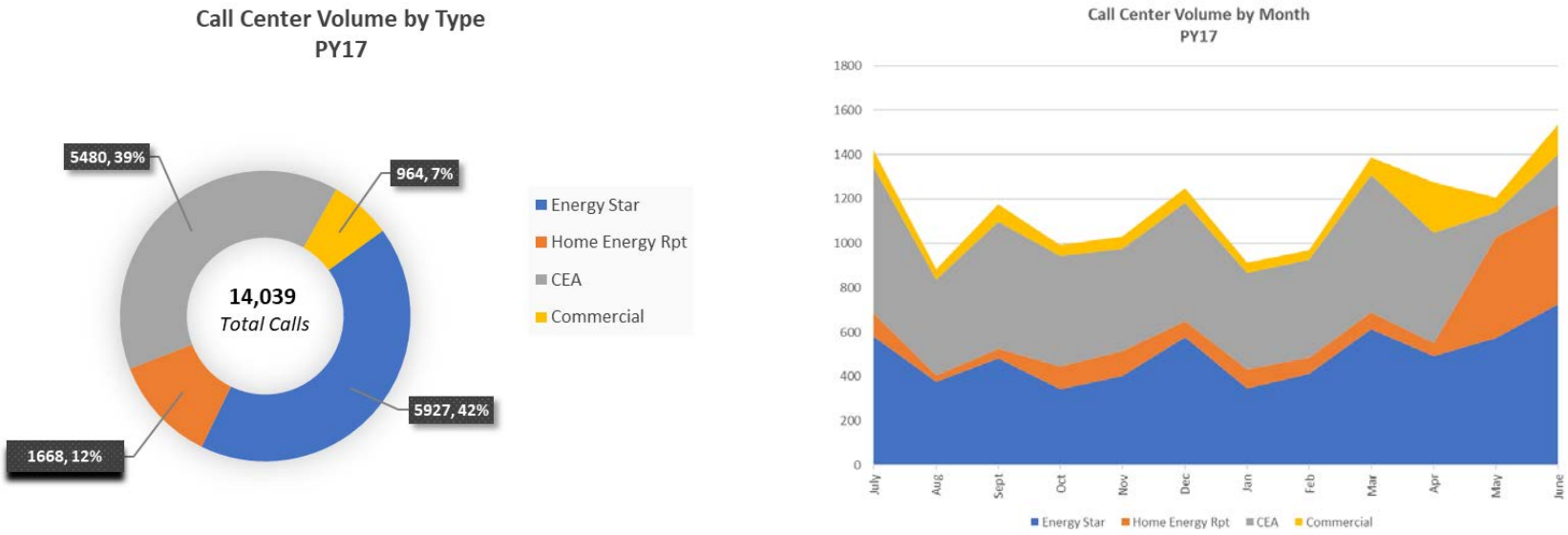
Figure 9 summarizes consumer participation for selected REEM measures.

Quality Customer Support

Hawai'i Energy's Energy Advisors educate customers every day on the various ways to save energy, through both program offerings and behavioral modifications that can be enacted right away. During PY17, Hawai'i Energy's residential call center handled 14,039 customer

calls. This represents an increase of over 2,000 calls from PY16 attributed to a 38% increase year over year of general customer inquiries regarding Hawai'i Energy offers and an 83% increase of calls regarding peer group comparison reports. While these reports are associated with a smaller fraction of overall calls at 12%, the significant annual increase is in line with the Program's strategy of impacting customer engagement. Overall, 39% of our calls originated from Clean Energy Allies, while 54% of customers called to discuss residential rebates, peer group comparison reports, and to learn new ways they could save on their homes' electricity bills. See **Figure 10** for a chart showing Hawai'i Energy's call center volume throughout the year.

Figure 10
Hawai'i Energy Call Center Volume by Type & Month

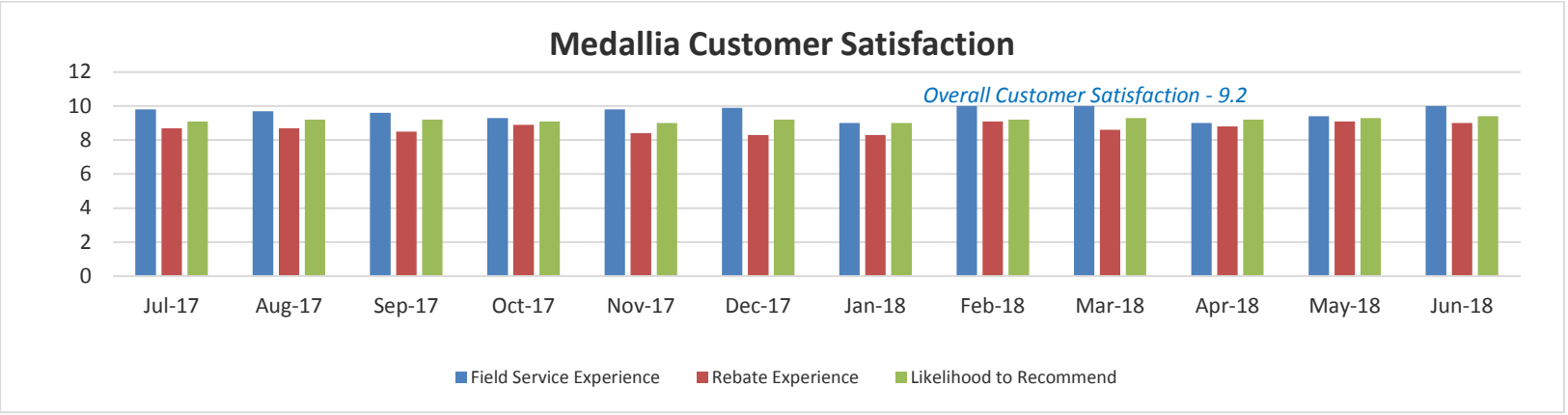


Customer Experience Management

PY17 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 3,158 surveys in PY17, which generated a response rate of 27% and an overall satisfaction rating averaging 9.2 out of 10. **Figure 11** below shows the monthly ratings in the categories of:

- Field Service – questions regarding the customer experience with on-site field personnel visiting their home for quality control inspections
- Rebate Experience – turnaround time from rebate application to receipt of check
- Likelihood to Recommend – customer likelihood to recommend Hawai'i Energy's programs based on their personal experience

Figure 11
Customer Satisfaction



In terms of official complaints, PY17 was a banner year for Hawai'i Energy with no complaints logged, compared with only five in PY16. Typical complaints revolve 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

- Solar Water Heating (SWH) Instant Rebate and Interest Buy-Down Programs – Solar water heating continues to be a major contributor to REEM lifetime savings with 1,301 solar water heating systems installed and incentivized either directly or through participating lenders, the Program saw a steady performance in PY17. Solar water heating remains a major contributor to the Program lifetime savings due to its 20-year deemed measure life.

- Solar Water Heating Inspections – Hawai'i Energy maintained its lowered inspection rate of 10% of all installations due to budget limitations. The Program may also select systems for inspections on other factors based on contractor performance on first-pass rates, new participating contractors, and for jobs on an 'as-requested' or 'as-needed' basis.

- Heat Pump Water Heaters - Representing a small but significant portion of the high efficiency water heating program, heat pumps accounted for 81 units for a total of $24,300 in incentives. This technology still represents a viable option for smaller household configurations where solar water heating systems cannot be installed. In PY17, Hawai'i Energy worked with Lowes to affect a midstream program, and continues to work with retail locations to increase the availability of heat pumps to consumers.

See **Table 40** for details of the High-Efficiency Water Heating offers.

Table 40 REEM High Efficiency Water Heating Program Impacts															
Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh Life)		Average Measure Life	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%	(Years)		$	%	$	%	$	%
Solar Water Heating	1,301	523	97.2%	2,339,290	95.3%	46,785,806	97.6%	20.0	1.1	$9,634,150	97.7%	$8,586,600	98.3%	$649,700	96.4%
Heat Pump Water Heater	81	15	2.8%	116,101	4.7%	1,161,011	2.4%	10.0	1.6	$231,794	2.3%	$145,800	1.7%	$24,300	3.6%
Total	**1,382**	**538**	**100.0%**	**2,455,391**	**100.0%**	**47,946,817**	**100.0%**	**19.5**	**1.1**	**$9,865,944**	**100.0%**	**$8,732,400**	**100.0%**	**$674,000**	**100.0%**

See **Table 41** for details on solar water heating systems installed by island.

Table 41 Solar Water Heating System Installations by Island							
Island	Units	Units (Pct)	Program Demand (kW)	Program Energy (kWh First Year)	Program Energy (kWh Life)	Incentives ($)	Incentives (%)
Oʻahu	891	68%	360	1,609,632	32,192,647	$444,900	57%
Hawaiʻi	194	15%	305	712,123	14,242,460	$191,422	25%
Maui	219	17%	93	426,583	8,531,654	$143,200	18%
Lānaʻi	1	0%	0	1,787	35,738	$300	0%
Molokaʻi	1	0%	0	1,787	35,738	$500	0%
Total	**1,306**	**100%**	**759**	**2,751,912**	**55,038,236**	**$780,322**	**100%**

See **Figure 12** for a list of participating contractors that completed solar water heater installations in PY17, sorted by County.

Figure 12
Solar Water Heating Participating Contractors

O'AHU

Affordable Solar	Hako Plumbing, Inc.	Solar Help Hawaii
Alakai Mechanical	Haleakala Solar, Inc.	Solar Services Hawaii
Allen's Plumbing	Hawai'i Energy Connection	Steve's Plumbing Service, Inc.
Alternate Energy	Hawaiian Energy Systems, Inc.	Sun King, Inc.
American Piping & Boiler	Hawaiian Isle Electric, LLC	Sunetric
Apollo Solar	HI Power Solar	T.Iida Contracting, Ltd.
C&J Solar Solutions, LLC	Hi-Tech Plumbing Corp	True Green Solar
Commercial Plumbing, Inc.	Ho'a Solar Inc.	
Cool X Energy (Solar Cool/Sedna Aire)	Honolulu Plumbing Co., Ltd.	
Dorvin D. Leis Co., Inc.	PhotonWorks Engineering, LLP	
Energypro Hawaii	Poncho's Solar Service	
Grand Solar, Inc.	PV Tech	
Hako Plumbing, Inc.	Solar Help Hawaii	

MAUI

Accurate Plumbing	Perrin Plumbing, LLC
Alakai Mechanical	Poncho's Solar Service
Allen's Plumbing	Maui Pacific Solar, Inc.
Alternate Energy	Rising Sun, LLC
American Piping & Boiler	South Pacific Plumbing, LLC
Dorvin D. Leis Co., Inc.	Steve's Plumbing Service, Inc.
Haleakala Solar, Inc.	Sun King, Inc.
HI Power Solar	Sunny Solutions, Inc.
Sunshine Solar, LLC	

HAWAI'I

Alakai Mechanical	Hi Power Solar
American Piping & Boiler	Keith Shigehara Plumbing, Inc.
Apollo Solar	Kona Solar Service, LLC
Calvin's Plumbing, Inc.	Poncho's Solar Service
Commercial Plumbing, Inc.	Qualified Plumbing, Inc.
Dorvin D. Leis Co., Inc.	RT's Plumbing, Inc.
Drainpipe Plumbing & Solar	SolarAide Co.
Hawaiian Solar & Plumbing, Inc.	

High-Efficiency Lighting

In PY17, the High-Efficiency Lighting program achieved energy savings of 32,591,782 first year kWh and 4,635 kW of demand savings with $3,621,129 in incentives.

Consistent with the three-year plan to phase CFLs to LEDs, this year marked the end of Hawai'i Energy's promotion of compact fluorescent (CFL) bulbs, with LED technology making up almost 100% of the expenditures, with a small amount of CFLs carried over from 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 average incentive per LED bulb was lowered throughout the year, ending at an average of $2.14 to keep up with market pricing trends and mitigate free-ridership. A significant amount of effort was expended in the second half of PY17 to vigilantly monitor market conditions as LED lighting technologies and prices rapidly evolved.

Marketing efforts boosted awareness and web traffic with paid search campaigns for lighting and related terms, directing customers to the lighting portion of the Hawai'i Energy website. All limited time offers were posted to the Hawai'i Energy Promotions landing page and featured weekly on Instagram, Facebook and Twitter.

See **Table 42** for details.

Table 42
REEM High Efficiency Program Lighting Program Impacts

Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh Life)		Average Measure Life	TRB/TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives ($)	
		kW	%	kWh	%	kWh	%	(Years)		$	%	$	%	$	%
LED Lighting	1,656,069	4,629	99.9%	32,547,669	99.9%	488,215,033	99.9%	15.0	3.9	$96,561,115	99.9%	$24,661,961	100.0%	$3,619,768	100.0%
CFL	3,026	6	0.1%	44,113	0.1%	264,677	0.1%	6.0	9.2	$55,948	0.1%	$6,052	0.0%	$1,362	0.0%
Total	**1,659,095**	**4,635**	**100.0%**	**32,591,782**	**100.0%**	**488,479,710**	**100.0%**	**15.0**	**3.9**	**$96,617,063**	**100.0%**	**$24,668,013**	**100.0%**	**$3,621,129**	**100.0%**

High-Efficiency HVAC

For PY17, the High-Efficiency Air Conditioning program achieved first year energy savings of 825,795 kWh and demand savings of 224 kW with $196,105 in incentives.

The bulk of these savings were attributed to high-efficiency VRF Split air conditioners, accounting for about 73% of residential HVAC savings with 63% of residential HVAC incentives. After researching market saturation levels and reviewing program requirements, Hawai'i Energy reintroduced the VRF program in PY17 with significantly more strenuous efficiency requirements.

Hawai'i Energy's other residential HVAC offerings saw steady performance in PY17, 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 First Year)		Program Energy (kWh Life)		Average Measure Life	TRB/TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives ($)	
		kW	%	kWh	%	kWh	%	(Years)		$	%	$	%	$	%
VRF Air Conditioners	791	166	74.4%	606,323	73.4%	5,456,908	62.7%	9.0	0.4	$1,419,416	64.8%	$3,552,769	93.2%	$123,750	63.1%
Whole House Fan	455	40	17.9%	126,598	15.3%	2,531,969	29.1%	20.0	11.0	$598,344	27.3%	$54,600	1.4%	$34,125	17.4%
Window AC w/ Trade In	366	17	7.8%	63,596	7.7%	572,365	6.6%	9.0	0.9	$148,498	6.8%	$173,930	4.6%	$27,630	14.1%
Solar Attic Fan	212	0	0.0%	29,278	3.5%	146,388	1.7%	5.0	0.7	$23,627	1.1%	$31,800	0.8%	$10,600	5.4%
Total	**1,824**	**224**	**100.0%**	**825,795**	**100.0%**	**8,707,630**	**100.0%**	**10.5**	**0.6**	**$2,189,884**	**100.0%**	**$3,813,099**	**100.0%**	**$196,105**	**100.0%**

Variable Refrigerant Flow Systems

Mini-split systems with variable refrigerant flow (VRF) technology provide cooling to large numbers of thermal zones within a single building envelope. By continuously modulating the amount of refrigerant supplied to each indoor unit, the VRF system can quickly adjust to meet the loads of each zone and keep temperature fluctuations to a minimum, thus making it more efficient than standard mini-split AC systems.

- In this program year, 791 VRF systems, 2 tons or less, were incentivized through a $150 rebate per outdoor unit.
- Larger VRF installations, up to 3 tons, received a $250 rebate per outdoor unit, resulting in 51 rebates. Combined, VRFs provided a calculated overall first year energy savings of 606,323 kWh.

Window Air Conditioner

The Window Air Conditioner (AC) Trade-Up program, which offers residents a $50 rebate for the purchase of a qualified window AC when surrendering an old working unit for pick-up & recycling, accepted 366 applications for a total of $27,630 in rebates.

Whole House and Solar Attic Fans

Other efficient and cost-effective measures exist for home cooling including the use of whole house fans or solar attic fans. A whole house fan is a ventilation cooling system for the home that uses less energy than a traditional air conditioner. This energy efficient system works by pulling cooler air from the outside of the home to the inside, creating active cross breezes with open windows. For PY17, Hawai'i Energy incentivized purchases for 455 installations through a $75 rebate per system with a calculated first year energy savings of 126,598 kWh.

In addition to in-store signage, the Program deployed targeted digital banner ads (shown above) to help drive awareness of and participation in the $50 Window Air Conditioner Trade-Up program.

Solar attic fans are designed to exhaust hot air from the attic, reducing the opportunity for heat to further radiate into the living area of the home. Using the sun's energy for power makes the solar attic fan both a viable, affordable, and energy-efficient method for home cooling. Through a $50 per unit rebate, this year saw 212 purchases incentivized for 29,278 kWh of energy saved.

Smart Thermostats

New to PY17, the Smart Thermostats were offered for energy use reductions with automatic scheduling features, learning algorithms and two-way communications. The two-way communication features also present future possibilities for peak demand savings through participation in demand response programs as a targeted Integrated Demand-Side Management (IDSM) measure. At year end, rebate applications were distributed throughout various retail partners including Best Buy, Home Depot and Lowes.

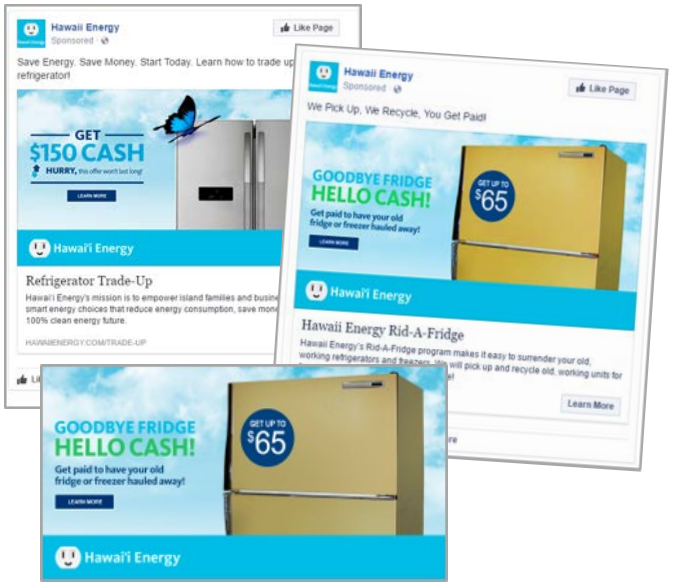
Some of the positive customer response to the HVAC programs can be attributed to a robust HVAC multimedia marketing campaign. Through various efforts staggered throughout the program year, Hawai'i Energy was able to reach out to wide groups of residents ranging from 5,000 to 338,000. HVAC programs were promoted to yield successful engagement in all forms of advertising. Online digital display ads promoting the Window AC Trade-Up program specifically increased traffic to the HVAC web page (see ad at right). Similarly, paid search campaigns for HVAC and related terms drove people looking for AC options to the Hawai'i Energy site. Together, these tactics drove over 4,500 people to the HVAC page during the four months they were deployed. Additional traffic to the cooling content was the result of monthly e-newsletters and promotional emails sent to over 160,000 Hawai'i residents during the summer months when cooling is top of mind. Concurrent retail efforts included Point of purchase (POP) signage on qualifying products and messaging to all participating partners about these stackable rebate offers for their customers.

High-Efficiency Appliances

In PY17, the High-Efficiency Appliances program achieved first year energy savings of 3,314,100 kWh and demand savings of 171 kW with $719,495 in incentives.

- Refrigerator Trade Up – The refrigerator "Trade-Up" program remained a staple of Hawai'i Energy's High-Efficiency Appliance program, accounting for 76.6% of the REEM portfolio's lifetime energy savings and 73.8% of the High-Efficiency Appliance program's savings. The 3,398 refrigerator trade-in rebates in PY17 represented increased performance from 2,230 in PY16. The rebate remained at $150 throughout the year to push consumers toward ENERGY STAR® models.

- Secondary Refrigerator/Freezer Recycling – Hawai'i Energy's "Rid-A-Fridge" rebate experienced increased performance in PY17 and remained a valuable incentive for residents to rid themselves of their inefficient refrigerators and freezers. These appliances, which are often found in garages and carports for extra food storage, constitute an important opportunity to reduce energy consumption and lower bills. By offering a $50 (O'ahu) or $65 (neighbor islands) rebate and coordinating with haulers and recyclers, Hawai'i Energy was able to influence the recycling of 541 refrigerators and freezers in PY17, achieving a lifetime energy savings of 5,701,396 kWh. This was double the 238 units in PY16; due to a solution for a "self-service" model on the island of Hawai'i to address the closure of the County scrapyard and complemented by various marketing campaigns.



- As the refrigerator programs continue to be a large part of overall savings goals, marketing continued with the multi-channel approach. Display ads (shown at right) and paid search including retargeting deployed for the Refrigerator Trade-Up and Rid-A-Fridge programs ran July through October and drove traffic to the web page. Radio spots also ran during Earth Day and holidays on top performing stations on all islands for a total reach of 613,600.

- In addition to these measures, the emails, direct mailers, and utility bill insert mailings, retail signage was key for in store promotions. With the largest number of demo products on the floor, POP signage and oversized clings on all products called attention to those refrigerators qualifying for the trade-up or Rid-A-Fridge rebate. The Hawai'i Energy website URL and a QR code for online rebates was provided on the signage for ease of application.

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, 50 participants (7 in Maui County and 43 on O'ahu) opted to donate their rebates, for a total of $2,605 going to feed Hawai'i's hungry. Hawai'i Foodbank, through its network of island food banks and their local food pantries and meal programs, provides food assistance to more than 123,000 households encompassing 287,000 islanders — or one in five island residents — including 47,894 keiki and over 46,000 kupuna. Hawai'i Energy's incentives of $2,605 is the equivalent of feeding meals to 6,786 hungry people.

- VFD Pool Pumps – Hawai'i Energy's VFD pool pump rebate program displayed steady performance in PY17, with 152 units rebated, down slightly from 172 in PY16. The program accounted for 794,609 kWh of lifetime energy savings.

See **Table 44** for details.

Table 44
REEM High Efficiency Appliances Program Impacts

Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh Life)		Average Measure Life	TRB/TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%	(Years)		$	%	$	%	$	%
Refrigerator w/ Trade In	3,398	101	59.1%	2,446,145	73.8%	34,246,026	76.6%	14.0	1.3	$5,458,048	75.4%	$4,077,600	89.8%	$509,650	70.8%
Rid-A-Fridge (Refrigerator)	486*	14	8.5%	365,804	11.0%	5,121,257	11.4%	14.0	21.3	$812,554	11.2%	$38,170	0.8%	$38,520	5.4%
Advance Power Strips	4,688	36	20.9%	317,656	9.6%	3,414,480	7.6%	10.7	4.6	$603,911	8.3%	$132,113	2.9%	$119,865	16.7%
VFD Pool Pumps	152	1	0.5%	79,461	2.4%	794,609	1.8%	10.0	1.1	$122,808	1.7%	$114,000	2.5%	$19,925	2.8%
Rid-A-Fridge (Freezer)	55*	2	1.0%	41,439	1.3%	580,139	1.3%	14.0	23.7	$92,047	1.3%	$3,880	0.1%	$3,905	0.5%
Window AC w/ Trade In	366	17	10.1%	63,596	1.9%	572,365	1.3%	9.0	0.9	$148,498	2.1%	$173,930	3.8%	$27,630	3.8%
Total	**9,145**	**171**	**100.0%**	**3,314,100**	**100.0%**	**44,728,876**	**100.0%**	**13.5**	**1.6**	**$7,237,866**	**100.0%**	**$4,539,693**	**100.0%**	**$719,495**	**100.0%**

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

High-Efficiency Electronics

Hawai'i Energy continued the midstream consumer electronics program in PY17. With a small incentive to retailers, Hawai'i Energy placed 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 PY17 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 9,400 ENERGY STAR® televisions and over 1,600 ENERGY STAR® sound bars sold over the year. Building on PY16, 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. Product rail cards identifying those products which earned the ENERGY STAR® rating were placed in stores on islands and were promoted via emails either in messaging or fun videos.

Energy Savings Kits

Hawai'i Energy continued its suite of online offerings in PY17, through the Energy Marketplace. Customers have the ability to purchase individual small measure items directly at reduced prices and shipping along with temporary kit promotions. Kits were promoted via email within the respective month the kit promotions were active. Each kit promotion was sent to an email distribution list of over 160,000 residential customers, which increased traffic and sales to the Marketplace order page. This year, the Transformational Program microsite project leveraged the promotional kits to incentivize engagement and participation between April and June. A total of three kit promotions were active in PY17.

- Promo Kit 1: The first promotional kit was offered in November of 2017, including a box of four highly discounted LED A19 bulbs and a Tier I advanced power strip with free shipping. Hawai'i Energy sold 893 kits during two promotions. This same kit was repurposed for the Transformational microsite, efficiencyunlocked.org (refer to the Transformational Program section for more details).

- Promo Kit 2: The second promotion took place in January and May, and included highly discounted LED lighting (eight A19 80W equivalent bulbs and two A21 100W equivalent bulbs). Customers could purchase up to 4 kits per home, and a total of 3,028 kits were distributed.

- Promo Kit 3: This third offer launched in April via our customer e-newsletter and doubled as an offer for the microsite. Total kits purchased totaled 103.

An example of website and email graphics used to promote the mail-order Energy Savings Kits throughout the year.

Behavioral Energy Awareness

In Y17, Hawai'i Energy's Peer Group Comparison Report program reached over 230,000 customers, reaching all eligible customers in Hawai'i, Honolulu, and Maui Counties. The program distributed personalized home energy reports (HERs) that provide 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.

The reports are one of the most impactful, and most recognizable offerings provided by Hawai'i Energy. The peer group comparison report continued to be one of Hawai'i Energy's 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 PY17, Hawai'i Energy distributed 979,039 paper-mailed personalized home energy reports (HERs) to 231,068 unique customers. 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 14,000,000 kWh in first year energy savings, or about 26% of total REEM savings.

See **Table 45** for details.

Table 45
REEM Energy Awareness, Measurement and Control Systems Program Impacts

Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh Life)		Average Measure Life	TRB/TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives ($)	
		kW	%	kWh	%	kWh	%	(Years)		$	%	$	%	$	%
Peer Group Comparison	2,535,018	4,595	100.0%	13,793,419	100.0%	13,793,419	100.0%	1.0	2.0	$2,355,225	100.0%	$1,196,304	100.0%	$1,196,304	100.0%
Total	**2,535,018**	**4,595**	**100.0%**	**13,793,419**	**100.0%**	**13,793,419**	**100.0%**	**1.0**	**2.0**	**$2,355,225**	**100.0%**	**$1,196,304**	**100.0%**	**$1,196,304**	**100.0%**

In PY17, as part of the Scheduling and Control Systems channel, Hawai'i Energy began offering highly discounted advanced power strips through City Mill stores. This plan also included scheduling and control systems such as occupancy sensors and timers through an upstream process. Direct-to-consumer enhancements under High-Efficiency Lighting were planned to allow for special offerings including specialty LED lighting, and targeted retailers including ACE Hardware, City Mill and Costco. Please see **Table 39** for details on Scheduling and Control Systems offerings.

Custom Residential Energy Efficiency Measures (CREEM)

Summary

In PY16, 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, as well as a Residential New Construction program to address the burgeoning construction industry and home development.

Residential New Construction

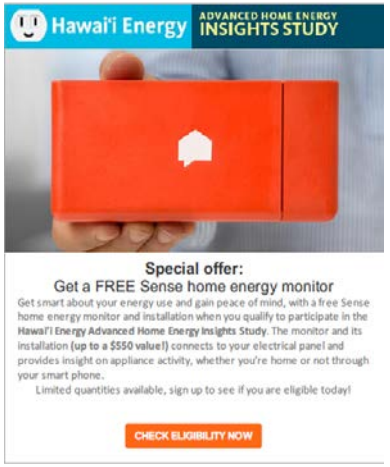
Hawai'i Energy introduced the Residential New Construction program in PY17. The program partnered with designers, builders, and developers to integrate energy efficient measures into newly constructed single family homes. In the initial planning phase, Hawai'i Energy obtained market intelligence from larger developers and local homebuilders to assess current industry practices, to understand the supply chain management complexities of purchasing

higher efficient products and equipment, and to provide education on the upcoming county adoption of the new requirements and compliance options available from the 2015 International Energy Conservation Code (IECC).

Hawai'i Energy provided prescriptive, tiered incentives for high efficiency LED lighting, ENERGY STAR® appliances, and cooling systems to reduce the cost of energy for new homeowners. Fully implemented in late 2017, the program recognized the efforts of Gentry Homes as a leading local developer committed to sustainable practices and providing long term energy reductions to their customers. Thirty-one homes from the SEAbridge development qualified for the program. Each home contained over 80% high efficiency (LED) lighting and were outfitted with a majority of ENERGY STAR® appliances. Additionally, the homes were built with a 17 SEER central air conditioning system installed with a smart thermostat to further reduce energy use, allowing the homeowner more control over their temperature and comfort. Upcoming efforts in the next program year will include prescriptive incentives in the affordable multifamily sector.

Home Energy Monitors

In PY17, Hawai'i Energy introduced the Advanced Home Energy Insights Study (Study) to research the costs and benefits associated with emerging technologies that identify patterns of usage and easily engage users with energy-saving insights through smart phone applications. The Study utilized the Sense home energy monitor to detect and track energy usage at the home. The Sense monitor analyzed changes in current and voltage at micro-second intervals using a household Wi-Fi connection and reporting real-time energy use from a web interface or iOS/Android application. Sense automatically identifies unique power signatures ranging from household appliances to portable devices and converts the information to find opportunities which may reduce energy usage, even detecting possible malfunctioning appliances.



As part of the Study, customers were encouraged to use the monitor for a period of 24 months, agreeing to answer survey questions and to share energy usage data, such as device specific details, application usage metrics and other data related to household energy usage. Hawai'i Energy compiles survey responses in addition to any measured and derived data into a database with other study participants. Data is used to assess energy savings costs and benefits associated with home energy monitoring products and to explore how better to serve customers with relevant, timely, and actionable energy information and services. Participation was voluntary and all participants may opt out at any time. See **Table 46** for details.

Table 46
CREEM Program Impacts

Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh Life)		Average Measure Life	TRB/TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%	(Years)		$	%	$	%	$	%
Residential Custom	37	7	100.0%	51,057	100.0%	251,411	100.0%	4.9	2.5	$50,995	100.0%	$20,350	100.0%	$20,350	100.0%
Total	**37**	**7**	**100.0%**	**51,057**	**100.0%**	**251,411**	**100.0%**	**4.9**	**2.5**	**$50,995**	**100.0%**	**$20,350**	**100.0%**	**$20,350**	**100.0%**

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 PY17, the program continued 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 in PY16 that saw immediate success and gained even more traction this year. 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

The Program offered Solar Water Heating Tune-Up rebates and collected data on existing system ages and conditions. For PY 17, 2,323 tune-ups rebated at $100 on qualifying solar water heating tune-ups. There were 64 actively participating contractors for this program year. 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, while boosting their businesses with program marketing efforts.

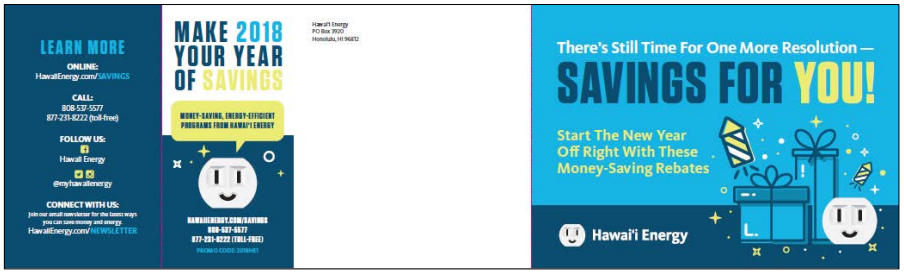
The average age of the systems receiving tune-ups was 9.4 years, slightly down from 10.0 in PY16. Eleven units were over 20 years old, while 22 were over 30 years old. Overall, the condition of the units was "good", with only 20% of units receiving a "fair" or "poor" rating. Nevertheless, contractors reported that the systems they tuned up were typically long-overdue for maintenance, and their services would improve efficiency and prolong system lives.

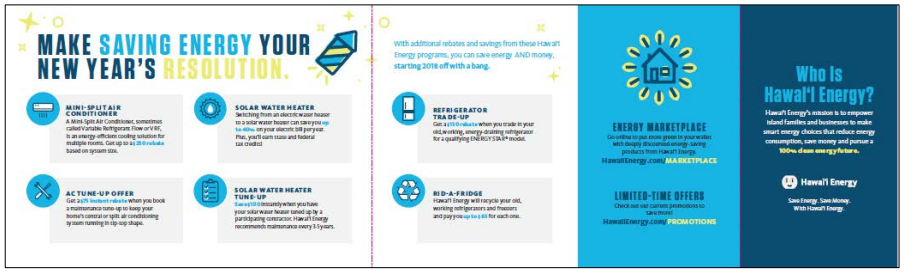
Residential A/C Tune-Up Program

In its second year, Hawai'i Energy's **Residential A/C Tune-Up** program was introduced through participating contractors to encourage residents to keep their central or split-A/Cs running at peak performance and optimal efficiency. The Program processed 2,450 tune-up rebate applications for central and split air conditioning units, almost three times the amount completed in PY16.

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. Building on the success seen in PY16 using direct mail, two campaigns were sent in spring 2018 to over 118,000 eligible residents in targeted zip codes known to be in residential developments with central air conditioning. Participation was encouraged using a personalized letter format similar to that used in PY16.

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.





The Program was able to maximize results from direct mail campaigns (like the one above) by harnessing customer data. Mailers were based on segments such as neighborhoods with high concentrations of air conditioning, past participants in Hawai'i Energy's solar water heating rebate (scheduled for a tune-up this year), and more.

Impacts

Overall, the RESM program's two offerings contributed energy savings of 1,376,703 first year kWh and 3,745,491 lifetime kWh to the residential portfolio. For details, see **Table 47.**

Table 47
RESM Program Impacts

Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh Life)		Average Measure Life	TRB/TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%	(Years)		$	%	$	%	$	%
Solar Water Heating Tune-up	2,323	69	27.9%	589,697	42.8%	2,948,484	78.9%	5.0	0.8	$581,645	81.2%	$696,900	48.7%	$232,300	55.9%
Residential A/C	2,450	178	72.1%	787,007	57.2%	787,007	21.1%	1.0	0.2	$134,582	18.8%	$735,000	51.3%	$183,750	44.2%
Accounting	0	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$0	0.0%	-$75	0.0%
Other	1	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$0	0.0%	-$75	0.0%
Total	**4,774**	**246**	**100.0%**	**1,376,703**	**100.0%**	**3,735,491**	**100.0%**	**2.7**	**0.5**	**$716,227**	**100.0%**	**$1,431,900**	**100.0%**	**$415,900**	**100.0%**

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

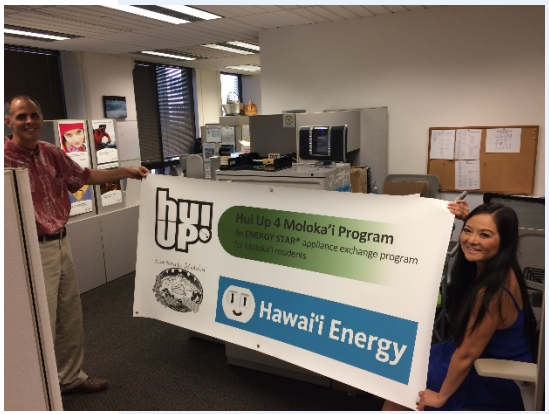
In Program Year 2017, Hawai'i Energy created and conducted Hard-To-Reach projects for some of the most in-need recipients to address a specific community need for direct intervention in the supply chain for high-efficiency appliances. In partnership with SustAINAble Moloka'i, the Council for Native Hawaiian Advancement and the Clean and Sober House, Hawai'i Energy delivered high-efficiency appliances, water heating, and HVAC to residents who would be otherwise unable to realize these energy savings.

Hui-Up Moloka'i

Residents of rural areas such as the island of Moloka'i typically do not have access to an appliance store resulting in barriers for replacement. With no access to an onsite retail location, the cost to ship, deliver and remove the old unit is prohibitive from a financial and logistics perspective. Partnering with SustAINAble Moloka'i, Servco and Makoa Trucking, Hawai'i Energy brought 296 ENERGY STAR® clothes washers, clothes dryers, window air conditioners and refrigerators to Moloka'i. A large bulk purchase discount was negotiated with Servco for new units, while the old units were brought to Makoa for proper recycling at Moloka'i's Kaunakakai recycling facility. Each resident also took part in an *Energy Unplugged* course conducted under the Transformational program. This year's deliveries brought the Program's total contribution since inception to over 1,000 ENERGY STAR® appliances.

Solar Hot Water Heater Direct Installation

Another successful project initiative was the direct installation of solar water heating systems for residents working with the Council for Native Hawaiian Advancement (CNHA) as recipients of a Native American Housing and Self Determination Act (NAHASDA) grant to install solar hot water systems for Department of Hawaiian Homelands (DHHL) properties on Moloka'i, Maui, Hawai'i and O'ahu. Due to a quickly lapsing grant timeline, Hawai'i Energy worked with CNHA to manage the project via our participating contractor channel with a request for quote process through complete installation. At project completion, twelve systems were installed in these island homes. Lifetime maintenance was included in the installation cost to ensure longevity and performance.



Hui Up Moloka'i Participant Survey

A customer survey was sent to Hui Up participants to ask about their experience with the program. Some of the feedback is highlighted here.

"I love my electric bill. I saved over 100 dollars!!"

"Mahalo Nui for your continuous kind generosity. Learned something very new and thankful for it."

"Definitely I would recommend this program to a friend or relative. "

"Thank you very much for caring and helping."

The Resident Manager at Hawai'i Sober Living and Recovery Center in Kailua-Kona poses here with a Hawai'i Energy field technician after receiving energy-saving devices in 26 units.

Hawai'i Sober Living and Recovery Center

Hawai'i Sober Living and Recovery Center is a transitional residential housing facility in Kailua-Kona on Hawai'i Island that offers treatment and recovery programs to residents along with job training to work on independent life skills, while being part of a tight recovery community. The Program first came became aware of this facility when the Multifamily Direct Installation Program installed new lighting, water measures and advanced power strips on the property. This facility had 26 units identified with very old refrigerators in need of replacement, ranging from 15 to 28 years old. Hawai'i Energy arranged the bulk purchase and delivery of 26 ENERGY STAR® replacement refrigerators and hauled away and disposed of the old units.

Multifamily Direct Installation Program

In its fourth year, the *Energy Smart 4 Homes* program (ES4H) continued to be successful in helping underserved, hard-to-reach multifamily communities throughout Hawai'i Island, Maui, Moloka'i, and O'ahu. The American Council for an Energy Efficient Economy (ACEEE) reports that, on average, lower-income households spend more than triple the amount of their household income on utilities than those with higher household earnings. ES4H helps relieve the energy burden of those in need, by furnishing a turnkey solution to install high-efficiency lighting, high-efficiency showerheads, faucet aerators and advanced power strips to multifamily residential dwellings. The program targeted hard-to-reach segments including public housing, transitional housing, seniors, low-to-moderate income privately owned properties, and special needs facilities. In PY17, the ES4H program retrofitted 5,964 multifamily units and achieved 1,812,598 kWh in energy savings.

One of the significant highlights of this program was the collaboration with the City and County of Honolulu (City) to retrofit the Department of Facility Maintenance's affordable rental housing projects throughout O'ahu. A resolution was passed by the City Council and signed by Mayor Kirk Caldwell to utilize the ES4H services that ultimately retrofitted over 1,100 units at 11 properties from Kāne'ohe to Kalihi and from Chinatown to 'Ewa Beach. The City is setting the pace for promoting resilient communities and pursuing energy efficiency solutions for their affordable housing properties. Through coordinated efforts with Hawai'i Energy and local property management companies, these City properties will enjoy the lasting energy and cost savings afforded by the Energy Smart 4 Homes program.

Public officials untie the ceremonial maile lei at Marin Tower, kicking off a major energy-saving retrofit of apartment units in the downtown district through Energy Smart 4 Homes*. Pictured L-R: PUC Commissioner Jay Griffin, Mayor Kirk Caldwell, PUC Commissioner Lorraine Akiba, Hawai'i Energy Executive Director Brian Kealoha, PUC Chairman Randall Iwase, City & County of Honolulu Office of Sustainability & Resiliency Director Josh Stanbro and Councilwoman Carol Fukunaga.*

The program launched at the Marin Tower property in Chinatown with a ceremony attended by City and State officials. "Reaching Hawai'i's mandate of 100 percent renewable energy by 2045 is going to take all of us working together, and each residential unit that's retrofitted with energy-saving LED lighting takes us closer to our goal," said Mayor Caldwell. "Beginning with our project at Marin Tower, our close partnership with Hawai'i Energy will help O'ahu taxpayers realize $120,000 in savings each year. We're excited to see even more savings moving forward as we retrofit more than 1,000 city-owned housing units across O'ahu." Chairman Randall Iwase of the Hawai'i Public Utilities Commission stated, "I commend the City and County of Honolulu

for its ongoing efforts to reduce energy costs in the City's multifamily residential properties through the installation of energy efficient equipment. Ensuring these families are provided the ability and information to reduce their energy usage is crucial in helping them reduce their monthly expenses. Ensuring access and participation through programs like this offered by Hawai'i Energy and in partnership with the City, helps Hawai'i to stay on track, and head full speed towards 100% clean energy by 2045."

Other significant ES4H services in PY17 are noted below:

- Retrofit services were delivered to Hawai'i Island and Maui counties as well as to low-income multifamily and single family Department of Hawaiian Homeland (DHHL) properties on O'ahu. The retrofits were highlighted by properties in Hawai'i County: Hale Hoa Aloha apartments in Hilo, a HUD affordable housing rental property; the Hualālai Elderly Housing facility, a low-income property operated by the Hawai'i Island Community Development Corporation; and the Hawai'i Clean and Sober Living facility in Kailua-Kona, where the retrofit of 32 apartments also led to the subsidized purchase of new refrigerators for each of these units through the bulk appliance purchase program, as noted above.

- Eighty apartment units were retrofitted at The Harry and Jeanette Weinberg Silvercrest Senior Housing facility in Wahiawa. This facility is a low-income apartment complex for seniors aged 62-years and older, subsidized by the Department of Housing and Urban Development, and owned by the Salvation Army.

- Over 200 one and two bedroom senior apartment units were retrofitted at the Pohai Nani senior community in Kāne'ohe operated by the Good Samaritan Society. Pohai Nani offers a wide variety of need-based care for its residents.

- The Kulaokahua Apartments were serviced under Housing Solutions Inc., a transitional housing program with studio and one-bedroom units for people at least 62 years old. Applicants must have been referred by an outreach agency or emergency shelter authorized by the State of Hawai'i to verify homelessness.

- Multiple properties, under The Arc in Hawai'I, were serviced, spanning locations across Honolulu County, such as in Waipahu, Wahiawā, 'Aiea, Kailua, and 'Ewa Beach. The Arc in Hawai'i is a nonprofit organization devoted solely to working on behalf of people with intellectual disabilities.

Nearing the end of the program year, the O'ahu housing sector for the ES4H program experienced the effects of market saturation resulting in a decrease in property acquisition. Sales tactics were subsequently adjusted to reach less accessible decision makers and a custom direct mail campaign was developed to specifically pursue properties with minimal contact details. Prospective tenants and landlords were contacted with a letter identifying the eligibility of the multifamily property and conveying the benefits of participation in the program. The success of the campaign yielded approximately a 50% response rate. The letter offered multiple ways to sign up for the program, including an online landing page and specific e-mail and telephone options. Program content was also posted in an ad to the Purchasing Hui, an organization comprised of over 400 property and building managers. Through this advertisement an invitation was extended to have Hawai'i Energy to present at member meetings.

Impacts

The RHTR program accounted for energy savings of 1,600,417 first year kWh and 17,333,003 lifetime kWh. The multifamily direct install program alone contributed to 1,812,598 kWh in combined RHTR and BHTR energy savings with retrofits completed at 5,964 residences. The BHTR impacts generally represent about 35% of energy savings, as many residential customers fall under commercial, master-metered rate codes. See **Table 48** for a summary of impacts.

Table 48 RHTR Program Impacts															
Category	**Units**	**Program Demand (kW)**		**Program Energy (kWh First Year)**		**Program Energy (kWh Life)**		**Average Measure Life**	**TRB/TRC**	**Total Resource Benefit (TRB)**		**Total Resource Cost (TRC)**		**Incentives**	
		kW	**%**	**kWh**	**%**	**kWh**	**%**	**(Years)**		**$**	**%**	**$**	**%**	**$**	**%**
LED Specialty	21,170	75	16.6%	525,475	32.8%	7,882,121	45.5%	15.0	6.8	$1,558,959	40.6%	$230,138	24.3%	$209,046	23.7%
Residential Custom	465	59	13.1%	353,242	22.1%	5,107,478	29.5%	14.5	3.8	$1,062,022	27.7%	$278,779	29.5%	$278,779	31.6%
Showerhead	1,998	212	46.9%	328,353	20.5%	1,641,764	9.5%	5.0	8.5	$591,223	15.4%	$69,587	7.4%	$61,235	6.9%
Advance Power Strips	2,996	26	5.7%	226,149	14.1%	1,130,744	6.5%	5.0	2.8	$221,843	5.8%	$79,781	8.4%	$79,781	9.1%
LED Lighting	2,918	10	2.3%	72,039	4.5%	1,080,582	6.2%	15.0	5.4	$213,722	5.6%	$39,940	4.2%	$36,745	4.2%
Faucet Aerator	4,658	68	15.0%	80,646	5.0%	403,228	2.3%	5.0	3.2	$169,160	4.4%	$52,441	5.5%	$46,200	5.2%
CFL Specialty	768	2	0.5%	14,514	0.9%	87,086	0.5%	6.0	2.9	$18,328	0.5%	$6,217	0.7%	$5,069	0.6%
Accounting	0	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$185,330	19.6%	$161,293	18.3%
Accounting-Sales Tax	0	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$3,012	0.3%	$3,012	0.3%
Total	**34,973**	**451**	**100.0%**	**1,600,417**	**100.0%**	**17,333,003**	**100.0%**	**10.8**	**4.1**	**$3,835,256**	**100.0%**	**$945,226**	**100.0%**	**$881,161**	**100.0%**

Expenditures

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

TRANSFORMATIONAL PROGRAM

Introduction

Hawai'i Energy's market transformation program seeks to identify, assess and help overcome market barriers that inhibit residents and businesses from adopting energy efficient technologies and practices. The transformational program supports and complements resource acquisition efforts and provides force multipliers to expand upon the pool of early adopters of emerging efficient technologies, positively influence behavior and consumer choices, and train professionals whose work includes decision-making around energy efficient technologies. Through strategic alliances and partnerships with key subcontractors, the Program had notable successes in program areas including energy literacy in hard-to-reach communities, professional development for Clean Energy Allies (CEAs) and targeted building operations and maintenance professionals in the commercial and industrial sectors, and data-driven pilot programs to increase the institutional investment in energy efficiency measures.

Building on successful work in 2015-16 to encourage the passage of state legislation to strengthen the energy conservation code, this program year Hawai'i Energy and the State Energy Office encouraged adoption at the county level and sponsored free code training sessions statewide, helping several hundred design and construction professionals, government officials and members of the public to understand the new code and how to successfully implement it. It is estimated that the new code will mean 4.7 million megawatt-hours and over $1 billion saved in homes and businesses over the next twenty years. The Program also expanded on its pilot Continuous Energy Improvement (CEI) efforts, which have created a comprehensive program for larger institutions to achieve ongoing energy improvements through systemic and deep-rooted changes in operations, maintenance and behavior. Hawai'i Energy staff led trainings and workshops with two institutional members of the inaugural cohort to kick off and implement customized CEI programs.

This year, the residential and business transformational program met all metrics for annual targets, exceeding targets in several areas, and made progress in the "hard-to-reach" ratepayer sector. For reporting purposes, transformational initiatives are organized into five support segments - behavior modification, professional development and technical training, energy in decision-making, codes and standards, and clean energy collaboration, with key projects in each segment outlined in **Table 49.**

Table 49 Transformation Metrics			
Key Focus Area		**Target**	**Achieved**
Behavior Modification			
Workshops & Presentations	"Energy Unplugged " Workshops	2,100	888.5
	"Sharing the Aloha" Workshops		905.0
	Blue Planet Student Workshops and Energy Summit		2,630.5
	Community Stakeholder Presentations		71.0
	ReNEW Rebuild Hawai'i Forum Support		54.0
Total Workshops & Presentations			4,549.0
Gamification Campaign & Competitions	Hawai'i Energy "Jingle Ball" Contest	200	3,535.0
Total Gamification & Competitions			3,535.0
Social Media and Mobile Messaging	Blue Planet Digital Engagement	3,250	4,213.0
	Hawai'i Energy Social Media Platforms		115.0
Total Social Media and Mobile Messaging			4,328.0
Transformational Videos	"Hawai'i Energized" Episodes	3	3
Total Transformational Videos			3
Professional Development & Technical Training			
Clean Energy Ally Support & Training	Clean Energy Ally Support & Training	8,370	829.8
Targeted Ally Training Opportunities	HECO Bill Training		54.0
	Certified Energy Manager (CEM) Training		461.5
	HVAC and Power Quality Training		246.0
	Advanced LED Lighting and Controls		1,016.0
	Mark Jewell Segment Guides		5.0
Targeted Participant Trainings	Program Trainings (Sector Specific)		995.0
	Building Operator Certification (BOC©)		1,561.0
	Sector Specific Conference Presentations		628.5
	IFMA		660.0
	Commercial Kitchen Efficiency Training		180.0
	Hawai'i Energy Inaugural Innovation Symposium		1,259.5
Educator Training and Grants	Blue Planet Student Energy Summit		255.0
	STEM Conference		36.0
	ENGiE Ka Hei Teacher Training		1,048.0
Energy Industry Workforce Development	Hawai'i Energy Fellows Program		1,504.8
Total Professional Development & Technical Training			10,740.0
Energy In Decision-Making			
Strategic Energy Management (SEM)	Continuous Energy Improvement (CEI) Program	2	2
Codes and Standards			
Codes Adoption - County Level	Advocacy and Legislative Support	9	10
Code-Related Training & Compliance	IECC 2015 Multi-Island Trainings	70	976.5
Leading Edge Technologies and Strategies	Energy Efficiency Codes Coordination Subcommittee Meetings	4/1	4/1
Clean Energy Collaboration			
iDSM pilot project		N/A	N/A

Behavior Modification

In PY17, the Program provided more offerings and customer touchpoints in encouraging behavior change with 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 counts and 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 2,100 behavior modification participant hours during the program year and achieved a total of 4,549 participant hours. The goal was attained and surpassed through community and student workshops, and sponsorships of community events and initiatives.

Workshops and Presentations

Community Workshops

Teaching energy literacy while helping to relieve the energy burden to underserved, hard-to-reach communities has always been a hallmark of the behavior modification focus area. The nearly 80 workshops conducted this program year, utilized multiple delivery styles designed to guide the participant in finding straightforward ways to lower their monthly energy bills. They were facilitated by local instructors with strong community relationships serving approximately 2,000 residents and attaining approximately 2,400 participant hours.

The *Energy UNPLUGGED* workshops transformed participants into energy entrepreneurs, teaching practical ways to put money back in their pockets simply by changing their habits. The workshops played on the idea creating of additional energy income and enabling the participant to have more money for discretionary purchases. The workshop updated the humorous “Top Ten” list of energy habits of an energy entrepreneur. Notable workshop experiences included the following:

- The Kekaulike Courtyard management had been a long-time supporter of Hawai‘i Energy, benefiting from multiple program offerings in the past. Their mission was to provide quality, safe, and affordable rental opportunities for households earning less than the State’s median income. The workshop was held in an intimate community room where translation services in Mandarin were provided by the property manager; food and refreshments were enjoyed at this lively and interactive event.

- The Lili‘uokalani Trust workshop in Wai‘anae gathered entire families to the event and the instructor was able to spend one on one time with multiple members from each family, which created an atmosphere of greater support. The instructor stated, “A significant amount of time was spent on answering questions throughout the presentation. The attendees were very engaged and wanted to ask about their own strategies to reduce energy in the home,” which illustrates how eager these families are to learn how to save energy and money.

- An Energy Unplugged workshop was offered by Hawai‘i Energy at the January Building Industry Association (BIA) home show. The home show centered on residents interested in improvements/upgrades in their own home and was a 3-day event at the Blaisdell. Staff at the Hawai‘i Energy booth helped point people to the workshop, which was well received, with most people excited about the rebate programs. The presentation educated participants on current offerings and touched on the new offerings coming up in 2018.

- Two larger workshops focused on elderly groups, Moanalua Seniors and Kualoa He‘eia Kūpuna, each attracting large audiences of over 80 and 100 participants, respectively. These senior groups enjoyed learning about the simple ways to reduce energy use, and by the end of the presentations, became energy efficiency advocates, committed to espousing the newly found knowledge to their extended families.

"Sharing The Aloha" workshops remain one of the primary means of face-to-face interaction between Hawai'i Energy and residents in hard to reach communities across the state. Above, a workshop in Leeward O'ahu and below, participants of a workshop in a Hawai'i Public Housing Authority property in Palolo Valley.

The "Sharing the Aloha" workshops remained a popular mainstay for hard-to-reach communities. The workshops intertwined energy efficiency concepts and personal finance in a way that made some of these difficult concepts more palatable to residents. The series focused on social service constituencies and native Hawaiian community groups. Here is a sampling of the workshops' reach and impact:

- The workshop to Kapua I and II Head Start program on the Leeward Coast of O'ahu was presented specifically to parents. The Head Start program is an early childhood program for children in need. Many of the parents didn't realize the high cost of an extra freezer and were interested in "phantom power," something most people overlooked as they thought about energy savings opportunities.

- For the workshop at Mā'ili Land Transitional housing, a Catholic Charities short-term housing facility with a mission to provide assistance with dignity to families with children under the age of 19 who are homeless and help them become self-sufficient. The organizer was extremely engaged in garnering participation and even went door to door to encourage residents to join the workshop. All the families individually pay for their electric bill and were appreciative of the fun and creative way the workshop was delivered, and were particularly attentive to the significant impact of the water heater on their electric bill.

- "Sharing the Aloha" traveled to a senior group on Lāna'i coordinated through Maui Economic Opportunity, Inc., a nonprofit committed to helping low income individuals and families achieve economic stability; they were extremely grateful for having a speaker from Honolulu come to share energy saving tips. They felt that the information was simple enough that they could go home and share it with their family and friends and felt encouraged that purchasing LED bulbs was a simple step to save money.

- Multiple workshops were presented to Hawai'i Public Housing Authority properties. A large audience at Hauiki and Pauahala Homes were curious about how an electric water heater is tied to energy use and the impact a high-efficiency faucet and showerhead have on energy use. The residents at Pālolo Valley Homes asked many questions on rebates and the peer comparison report and how their energy usage varied from their neighbors.

The Blue Planet Foundation was a new entry into the hard-to-reach community program. The energetic workshops often incorporated energy efficiency with climate change and offered a means to become involved in the State's clean energy transition. Notable workshops in O'ahu and Maui County are presented below:

- Residents in a Moloka'i workshop were especially interested in Hawai'i Energy's online promotion kits to purchase ENERGY STAR® LED bulbs at a discounted price. The conversations ranged from the helpful tip of making sure the ceiling fan is rotating in the correct direction to the light-hearted banter of one participant quipping that "you know someone is from O'ahu because they leave the room without turning the lights off."

- Workshops at community colleges on O'ahu and Maui succeeded in attracting non-traditional students from varying socioeconomic backgrounds. At the Windward Community College, participants were interested how much money Hawai'i spent on fossil fuels and were engaged from the beginning and end. Almost half of the audience had a second refrigerator and were shocked at how much it was costing them each year.

- Hale Koa Hotel's Wellness workshop in Waikīkī, attracted a diverse group of hospitality staff including housekeeping, maintenance, assistant managers, directors, and front desk administration. Reaching this audience was especially significant since hotel management was committed to blocking out time for staff to participate in the presentation.

Members at Maui Farmer's Union United listening to an energy literacy workshop delivered by Blue Planet Foundation.

- An introductory workshop was presented to the board of the Maui Farmers Union United Hawai'i Chapter. As farmers, they were interested in both the residential and commercial resource acquisition programs and requested follow-on workshops for their constituents in the next program year.

Community Stakeholder Impact

The Program continued to support collaborative efforts with community stakeholders, connecting with community-based organizations and private entities to develop long-term relationships and raise awareness about energy efficiency through sponsorships, working groups, and presentations. As in previous years, the Program supported activities and organizations with like-minded objectives to achieve customer equity and reach underserved and hard-to-reach communities.

Hawai'i Energy staff from both the residential and business programs attended both the Kona and Hilo Faith-Based Summits to End Family Homelessness on Hawai'i Island and presented on the hard-to-reach programs. The summits aimed to help homeless families with children to transition them into permanent housing by using community resources, such as churches, and to offer a safe place for these families. During the year for a one week at a time, host church congregations provide overnight lodging, meals and hospitality for up to fourteen individuals. Host volunteers serve meals, interact with the guests and help the children with their homework while social service agencies help find housing, employment, government entitlements. The goal was to sign up to thirteen partner churches, and Hawai'i Energy pledged to donate refrigerators to all the host facilities. A thoughtful engagement activity involved participants experienced becoming a mock family, which mimicked the realities and challenges homeless families face when looking for housing resources.

Hawai'i Energy was invited by Hawaiian Electric Company (HECO) and Hawaiian Electric Light Company (HELCO) to present at their Low-Income Focus Group meetings. The meetings were a forum for nonprofit organizations and government agencies to provide information on low-income initiatives statewide and to encourage collaboration on these efforts. One of the goals was information sharing of practical and innovative approaches in tackling the energy burden on low income households. Hawai'i Energy staff presented to representatives from PACT, LIHEAP, Legal Aid Society of Hawai'i, HCAP, Catholic Charities,

Salvation Army, and Mutual Housing among others on the hard-to-reach programs including the Energy Smart 4 Homes program, the transformational community energy literacy workshops, and the bulk purchase appliance program (Hui Up).

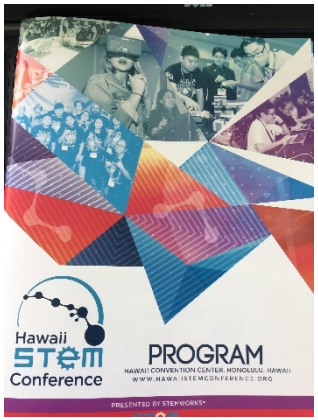
The Historic Hawai'i Foundation (HHF) hosted a panel to inform and create a dialogue of best practices for homeowners and designers to make their historic homes more energy-efficient. This event was part of HHF's Green Series in partnership with the Honolulu Chapter of The American Institute of Architects (AIA Honolulu). Hawai'i Energy offered and reinforced practical solutions for owners of historic homes to participate in incentive programs, depending on their household budgets and design considerations. HHF developed this series to "provide information, knowledge and tools to help historic homeowners reduce their homes' carbon footprint while retaining the properties' historic integrity. Implementable measures shared will help save energy, money and conserve resources while contributing to the health and vibrancy of local neighborhoods and good stewardship of Hawai'i's natural assets."

Student Workshops

The sustained investment in youth audiences was fundamental in building a knowledgeable, informed, and empathetic future generation. Student and youth workshops explored energy concepts and opened the dialogue for developing actionable solutions to reach Hawai'i's clean energy future. The workshops incorporated hands-on activities using educational tools from prior program years, such as infographics, videos, and social media platforms, to help encourage conversations while expanding students' problem solving skills. Highlights from the program year included the following:

- The Blue Planet Foundation held its annual 2017 Student Energy Summit at Mililani High School over Veteran's Day weekend. This summit provided an immersive learning experience for both students and teachers alike, with participation of approximately 250 students and around 30 public and private schools. The accredited Ka Hei Professional Development curriculum (refer to the section on Educator Training) was conducted at the Summit to provide educators the tools and resources to effectively teach energy concepts in K-12 classrooms. Three half-day workshops were completed over two days with teachers studying project- and inquiry-based learned techniques to help creatively engage and educate students.

- As part of the routine engagement in the classroom, the Blue Planet Foundation conducted over 50 student workshops at K-12 classes, reaching over 1,700 participant hours. Various presentations were held at both public and private schools, punctuated by presentations to elementary school classes. One student said he now knows that he can plug in a TV to a smart strip and it will turn on other "electricity things." Another student was amazed that by changing their incandescent bulbs to LEDs bulbs they can a save a few hundred dollars during the first year. Instructors created an atmosphere of enthusiastic engagement during workshops, delivering rally-type chants like, "when I say 'Efficiency!' you say 'Fast and Easy!'" The Blue Planet team also presented to high school students in Industrial and Engineering Technology (IET) Core, pre-engineering, and programming classes, where they used the house infographics to identify all the areas of energy efficiency and break down the highest device level energy users.



STEM

Hawai'i Energy's commitment to science, technology, engineering, and mathematics (STEM) efforts continued with the youth STEM conference coordinated through the Maui Economic Development Board (MEDB). The annual conference held on O'ahu attracted over 1,100 participants from more than 100 Hawai'i public and private middle and high schools, over 140 industry partners, and over 500 students and 300 teachers. Participants took part in more than 85 break-out sessions led by industry partners and engaged in hands-on STEM activities. Hawai'i Energy staff co-presented with the Blue Planet Foundation in educator professional development sessions and energy efficiency education in student workshops. Additionally, the Hawai'i Energy team participated in the industry and student networking 5x5 session where students interview and engage with industry professionals in short 5-minute intervals, asking questions about career pathways, advice, and personal experiences.

Hawai‘i Energy was one of the main sponsors for second annual Boy Scouts Ellison Onizuka Day of Exploration which supported both transformational and marketing efforts. This traditional Makahiki was free to the public and was filled with STEM-based activities, competitions, and speaker panels that brought in a crowd of over 10,000 youth and families. Hawai‘i Energy employed various engagement and interactive activities including the Power Grid Protectors “Jenga” game where participants toppled the grid by being energy wasters, the gamified microsite, EfficiencyUnlocked.org, that toured participants through rooms of a home and highlighted energy efficiency and conservation tips and tricks, and the popular LED light bulb hand crank to teach the importance of switching from incandescent to LED lighting. Hawai‘i Energy staff also presented two workshops to enthusiastic Boy Scouts and their families using hands-on activities, visual aids, and an online quiz game to reinforce energy conservation and efficiency practices.

The Girls’ Summit in Maui, a STEM event by the Patsy T. Mink Center for Business and Leadership (MCBL), was a gathering for high school-aged young women of all backgrounds to network with successful female leaders in the community, especially in STEM-related fields. Career advice in the forms of speed mentoring and energy efficiency concepts were spotlighted during the Energy UNPLUGGED session.

The Aloha+ Challenge and Hawai‘i Green Growth

The Program again was a community sponsor of Hawai‘i Green Growth (HGG), a public-private partnership dedicated to social, economic and environmental goals for Hawai‘i’s sustainable future in keeping with the UN 2030 Agenda. HGG continued its efforts to track progress through the Aloha+ Dashboard. The six areas of the Dashboard, Clean Energy, Local Food, Solid Waste, Smart Sustainable Communities, Green Workforce/Education, and Natural Resource Management, all intersect with energy, but Hawai‘i Energy is particularly involved in the tracking and achievement of the Clean Energy and Green Workforce goals – the former through resource acquisition and transformational efforts in energy efficiency, and the latter through our support of internships and fellowships for young professionals.

ReNEW Rebuild Hawai‘i

Hawai‘i Energy once again sponsored the ongoing ReNEW Rebuild forum, which brought together public and private sector stakeholders for discourse on statewide and Pacific area energy projects, especially for underserved populations. Highlights during this quarterly forum included specific innovative approaches for lowering energy costs and improving housing in Hawai‘i. A diverse group of speakers presented on a range of energy and sustainability topics including the public/private collaboration for the Kahauiki Village project, a groundbreaking initiative to create an affordable plantation-style community as long-term housing for Hawai’i's homeless families; LEED Platinum certification for an affordable housing project in Kaua‘i; a solar project for the Miloli‘i native Hawaiian village; the National Renewable Energy Laboratory (NREL) performance report of the Department of Hawaiian Homeland’s Kaupuni net zero energy project; and the energy efficiency potential of

Top: Students take part in problem-solving activities at the annual Hawai‘i STEM conference, which Hawai‘i Energy sponsored this past year.

Bottom: Hawai‘i Energy team members engage with youth and families at the annual Onizuka Day of Exploration event at the Neal Blaisdell Center in Honolulu.

accessory dwelling units (ADUs) from Hawai'i ADU. Hawai'i Energy staff presented on the opportunities from the adoption of the 2015 International Energy Code, residential new construction initiatives, and programmatic information.

VERGE Hawai'i Conference

Held in June 2018, VERGE Hawai'i convened more than 700 key stakeholders — from government, military, corporations, utilities, NGOs and solution providers. Conversations revolved around lessons learned during the State's clean energy journey and explored the technical, political and cultural solutions necessary to build a clean, resilient economy. Hawai'i Energy team members played an active role in the 2018 VERGE Hawai'i conference on both the main stage and in a number of breakout sessions.

Contests and games like the iHeart Radio Jingle Ball giveaway and Power Grid Protectors game help the Program research engagement tactics and offer an alternative method of learning about efficiency.

The Program's Executive Director, Brian Kealoha, moderated a panel entitled *Scaling Distributed Energy Resources to Benefit Everyone* which also featured Jennifer Potter of HNEI, Michael Unebasami of the University of Hawai'i Community Colleges and Brody McMurtry of Johnson Controls. The basis of the panel was that in order for Hawai'i to achieve its 100% clean energy goal, it cannot rely solely on grid-scale projects, making Distributed Energy Resources (DERs) and the end-user an important piece of the puzzle. The panel discussed the innovative 100% UH Maui College project, the enabling technologies, and the importance of value stacking of benefits.

Resource Acquisition Manager Ramsey Brown spoke on the *Traditional Sustainability & Modern Clean Tech: Innovative Framework for the Food-Energy-Water-Nexus* panel, alongside native Hawaiian community visionaries and leaders discussing the integration of traditional Hawaiian wisdom and green practices with modern clean technology and resource planning and management.

Deputy Director, Caroline Carl presented in the breakout session, *Shifting the Building Industry: Integrating to Accelerate a Clean Energy Future*. This panel focused on the partnerships and collaboration needed between the developers, architects, utilities, DER innovators, technology companies, and community leaders in order to achieve environmentally resilient, socially equitable cities and communities.

Gamification Campaigns and Competitions

The Program's gamification campaigns help engage customers to influence real-world actions that reduce energy use and provide a communication pathway for encouraging multiple interactions between the customer and Hawai'i Energy. The gamified approaches used both digital and tactile-driven methods to enhance the customer experience.

In conjunction with national Energy Action month in October, Hawai'i Energy partnered with iHeartMedia to award one Hawai'i resident a trip for two to New York to attend the Jingle Ball music event in New York City. Leveraging this grand prize, a digital survey platform to gather information about home energy characteristics and participation in current Hawai'i Energy programs was created to collect the data and participant entries. After completing the survey, each participant was also given a challenge in the form of a pledge to take action: change one old, inefficient light bulb in their home to an LED bulb.

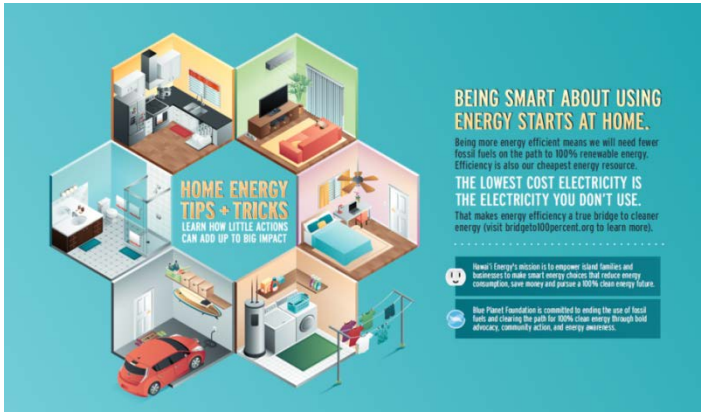
Promotional strategies and other marketing tactics to promote the contest included email blasts, weekly social media posts, radio spots on local channels, and outreach at events with contest entry opportunities. One significant outreach event was staged at Tamarind Park, attracting professionals in the downtown Honolulu business district. The contest ended in November and received close to 3,700 completed surveys and pledges with approximately 3,500 verified and eligible e-mails.

For a more tactile hands-on gamified approach, an educational playing card and wood block tower game called "The Power Grid Protectors" was developed in collaboration with the Blue Planet Foundation. The game combines card-play with a wooden "Jenga-like" structure representing the power grid, and game participants draw cards and take direction depending on the action written on the card. The game play ends when the grid is toppled from removing the power blocks.

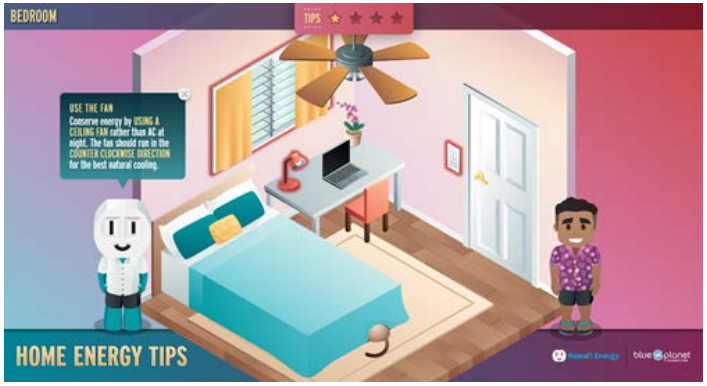
This game was designed to flip the conventional pedagogy of classroom instruction into a group interactive experience in which lively discussions occur and where participants are having so much fun they may not realize they're actually learning energy concepts. Early results from events and workshops were positive; participants learned about the challenges facing the grid's infrastructure and that personal choices and collective actions, either positively or negatively, will impact Hawai'i's energy future. The full version of the game was deployed at the end of the program year and will be used at appropriate events and presentations.

Digital Engagement with Social Media and Mobile Messaging

Hawai'i Energy contracted Blue Planet Foundation and designer Wall-to-Wall Studios to create an interactive microsite called EfficiencyUnlocked.org. By definition, a microsite is designed to function separately from a main website URL with purposes differing by social media campaigns, projects, content, and goals. The new Efficiencyunlocked.org microsite was developed to creatively engage customers to learn cost effective or free ways to reduce energy consumption in their home. It placed a focus on specific, in-home content using eye-catching color and design to inspire enhanced digital interactions with the customer. With their virtual hosts, Pluggy and Keoni, customers were taken on an interactive tour into an island home where they gained knowledge and tips by clicking on items within each room.



Above, the early concept sheet for EfficiencyUnlocked.org – an interactive web environment that highlights various energy-saving opportunities around the home. Below, the site as it is today, featuring Pluggy and Keoni in each room, encouraging participants to engage through interactive actions that eventually advance them through an entire home.



A multi-channel promotion of EfficiencyUnlocked.org included special offers and a grand prize contest. Promotional strategies launched during the program year included the following:

- Multiple email blasts deployed to Hawai'i Energy's list of over 160,000 residential customers and to Blue Planet's e-mail list recipients of over 6,000.
- Event outreach used LED display for live demonstrations.
- Social Media posts and ads scheduled weekly on Instagram, Twitter and Facebook.
- In-store video billboards displayed in a variety of local retailers.
- Hawai'i Energy banners on the home page and promotions page placed to take interested visitors through to the microsite landing page.

Sections of the microsite house were released monthly with a total of three different levels, giving the customer more opportunities to enter the grand prize drawing to win two standup paddleboards. Those who subscribed to receiving monthly information about Hawai'i Energy were entered and received via email an opportunity to purchase limited time discounted energy efficiency measures. Additional entries were given to those who engaged with Hawai'i Energy on social media platforms by following our Instagram and/or Twitter accounts. The results of the microsite campaign exceeded goal and collected over 2,900 subscribers. Over 150 additional social media followers were gained on Twitter and Facebook collectively. The microsite continues to gain new visitors and can be reached via a URL link within the educational pages of the Hawai'i Energy website.

Hawai'i Energy also worked with Blue Planet Foundation to create a digital engagement campaign on Instagram called #LikesforLights. This campaign invited Hawai'i-based social media influencers to share photos that encouraged a decarbonized and energy-efficient lifestyle. Instagram users were asked to 'like' and 'follow' their favorite photos which resulted in a pledge to donate lightbulbs to be distributed to local schools. The campaign increased almost 1,100 Instagram followers for Hawai'i Energy and targeted a younger audience that may not normally engage in energy efficiency practices.

Hawai'i Energized

A large part of supporting market transformation efforts is the use of marketing and communications tools to help raise the level of energy literacy among consumers. Hawai'i Energy continued producing its web video series called *Hawai'i: Energized,* which focused on informing and educating Hawai'i residents about energy efficiency concepts, interviewing community stakeholders, and highlighting energy efficiency projects across Hawai'i. These three short (5-8 minute), fun and entertaining videos hosted by Hawai'i Energy staff were disseminated through website and social media channels, such as Facebook, Instagram, and Vimeo. For the average consumer, information about energy-related topics is often technical and confusing, and the web series represents part of the Program's emphasis on breaking down these barriers. Producing this content in-house allows the Program to remain cost-effective and maintain control over creative decisions, messaging and distribution. The three web episodes were viewed over 800 times over various platforms.

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 training educators in energy efficiency, expanded internship offerings, and trained energy salespeople. This activity area also includes energy industry workforce development – supporting fellowship opportunities for young professionals to enter the field of clean energy. This year, the Program was able to surpass its participant hour goal of 8,370 hours, tallying 10,740 hours across activity categories. 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

Building Operator Certification (BOC©)

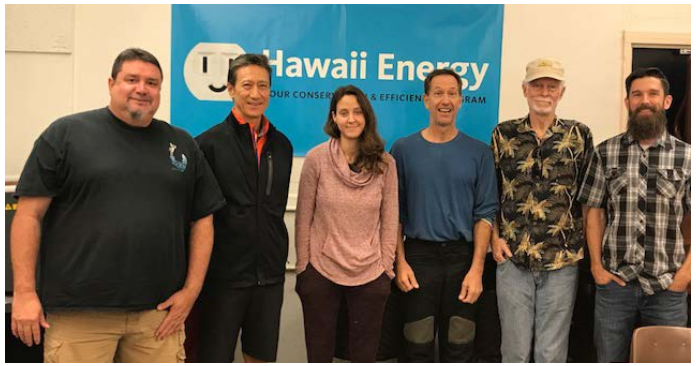
The Northeast Energy Efficiency Council (NEEC)'s BOC® program is a comprehensive, nationally-recognized energy efficiency training and certification in commercial building operations and maintenance and includes topics such as measuring and benchmarking energy performance, efficiency in HVAC and lighting systems, indoor environmental quality, and common opportunities and building scoping for operational improvement. Designed for facilities maintenance and engineering professionals from early career to management level, the rigorous eight-week, 56-hour course involves class time, homework assignments and a final examination to formally earn the credential. This year Hawai'i Energy again partnered with UH Maui College's Sustainable Living Institute of Maui (Maui SLIM) and UH Mānoa Outreach College to sponsor Building Operator Certification Level I and II and Level I courses, respectively. In

all, thirty-two students registered for and successfully completed the courses. Hawai‘i Energy was featured by the NEEC in its winter newsletter as a longtime partner/provider of the BOC program.

A new innovation in this year’s Maui SLIM offering included implementing a Go-To-Webinar online learning option for students in remote locations including Hawai‘i island, O‘ahu and the west side of Maui who were unable to attend every class in person to join via video conference. The new technology enabled participants to leverage distance learning option to access BOC trainings and successfully earn the certification. The cohorts who have been recruited to receive the subsidy in the past are truly in positions to make a transformational difference in energy use for their facilities. Large resort, hospital and other commercial building facilities in particular are enormous energy users and value these trainings that help minimize their energy use, and manage costs more efficiently and effectively. The facilities engineers recognize the value of the BOC trainings and continue to send their team members for the training to enhance the efficiency of their operations and thus their bottom line, as well as practice good corporate environmental stewardship. Here are some highlights of participant comments about the course:

“The class really helped me find new efficiencies in my department, and apply what I learned in the real world.”

“I am excited to bring this new level of knowledge to my job and add value to save money.”



Certified Energy Manager (CEM) Trainings

Hawai‘i Energy continued its partnership with the Association of Energy Engineers (AEE) to subsidize training seminars and certification programs in Hawai‘i. AEE certification curricula represent the leading edge in best practices and efficient technology and help energy professionals in Hawai‘i’s workforce continually upgrade their skills and the opportunity to gain designations such as Certified Energy Manager (CEM). 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. This year the Program sponsored CEM certification on Maui for 13 participants coming from a variety of backgrounds including utility employees, state employees, consulting firms, HVAC companies and other Energy Services companies. Though a considerable investment of time for students and employers, the week of training provides lasting dividends; participants gain valuable new tools that can be implemented into their work, a portable professional credential, while keeping energy efficiency top-of-mind in capital investment and operations and maintenance.

Lighting Training at UH Maui

This full-day course was developed to supplement the efficient lighting module of the Building Operator Certification. The industry trends and best practices are quickly evolving, so this training offers industry professionals or those wishing to enter it a robust overview of the leading edge in lighting. The course covers upgrades in lighting quality, lighting options that are now available in LED, the impact of lighting on mood and health, and provides instruction on how to conduct a lighting audit and retrofit. The training included a presentation, handouts and multiple lighting worksheets to analyze comparisons in lighting quality, efficiency and cost. Sixteen participants applied for and received tuition support. Evaluations were very positive and participants expressed plans to apply what they learned to current projects in their work.

Lighting Controls Workshop

Hawai'i Energy joined forces with the Hawai'i Chapter of the Illuminating Engineering Society (IES), the University of Hawai'i-Mānoa School of Architecture, Hawaiian Electric Co., and several other organizations to sponsor a two-day advanced lighting seminar called "Solid-State Lighting Design and Lighting Controls Workshop for Architects and Design Professionals." Featured presenter Dr. Jack Curren is a consultant to the U.S. Department of Energy and a nationally recognized expert in efficient lighting. The seminar covered lighting design and specification, LED physics, retrofits, control systems, sensors, Internet of Things (IoT), and coming trends to the industry. A total of 109 professionals attended the workshop.

HVAC and Power Quality Workshop

The Program helped to sponsor the International Facility Management Association (IFMA) Hawai'i Chapter's two-day technical seminar featuring instructor David Wylie, a seasoned energy efficiency engineer, and several top local experts. Topics included power quality, variable speed drives, HVAC, cyber security and more. Over the two days, the seminar attracted 88 attendees from engineering firms, the utility, institutions and the community. This seminar also served as a fundraiser for the University of West O'ahu's new facility management degree program.

Practical Building Energy Management and Retro-Commissioning

The transformational program worked with UH Mānoa Outreach College and a longtime facility engineer and BOC instructor to create two brand-new, full-day workshops for trade allies and targeted customers. The "Practical Building Energy Management" course provided participants with the essential methods and strategies for optimal energy usage in buildings and facilities, including mitigation of environmental consequences and reduction of operating costs. Participants also learned how to troubleshoot existing systems, operate equipment effectively to save energy, as well as to conduct building energy assessments and benchmarking.

Building commissioning, a process to assure a new building is performing as designed using a whole-building systems approach, and its counterpart for existing buildings, retro-commissioning, have been identified as areas in the energy code that are seldom implemented. The new "Retro-Commissioning" course was designed to spread awareness of how retro-commissioning can identify operational improvements that will increase occupant comfort, save energy, and provide cost savings. Participants gained the knowledge and skills to develop a plan that results in energy saving for their existing buildings and learned about financial incentives that are available to offset the up-front costs of retro-commissioning a building. Both new workshops were well-attended and received positive feedback.

Community Council of Maui Expo

The Program presented a keynote at the Community Council of Maui Annual Trade Show and Seminar, originally formed in 1991 as The Condominium Council of Maui (CCM) and now known as The Community Council of Maui (CCM). CCM is committed to hosting regular meetings to provide the opportunity for association members to exchange information, share experiences and ideas and reach solutions. This seminar and the event gathered approximately 250 attendees representing the AOAO, HOA, property management and related vendor community, historically a hard-to-reach sector for the Program. AOAO, HOA Board members and Facility Management representatives were given a high-level overview of the Hawai'i Energy program as well as an introduction to commercial and residential incentive offerings.

Educator Training and Grants

Accredited Educator Training

Hawai'i Energy supported the inaugural Ka Hei Teaching Energy Professional Development educator workshops conducted in Moloka'i and Maui which specifically targeted K-12 public school teachers. The Teaching Energy curriculum was formally approved by the Hawai'i Department of Education (DOE) in 2017 and provides public school teachers with "Professional Development Experiences that Educate, Empower, Excel," or commonly referred to as PDE3 credits, that count toward advancing their salary grade. This first of its kind accredited workshop utilized an inquiry-based learning experience that translates directly back into the classroom and equips teachers with the resources, knowledge and skills to innovatively teach Hawai'i's energy and energy efficiency concepts to students. Additionally, the workshop incorporates Science, Technology, Engineering, Art, and Mathematics (STEAM) methods that prepare teachers for the transition to the DOE's Next Generation Science Standards

On Moloka'i, the public schools that the professional development sessions served were under the Community Eligibility Provision (CEP), which stipulates at least 40 percent of their students qualify for free meals. The two-day workshop attracted 14 teachers and achieved over 200 participant hours. Another Ka Hei professional development session was conducted for DOE Maui teachers over a two-day period. Out of twenty schools in the Baldwin-Kekaulike-Maui area, eleven schools were represented with 38 teachers participating in the Kai Hei Teaching Energy with the STEAM PD workshop resulting in over 800 participant hours. The curriculum used the aforementioned inquiry-based learning methods to promote collaborative and hands-on learning activities in the classroom. (Photos: PD visual aid, PD Moloka'i, PD Maui 1, PD Maui 2)

Approximately 3,700 students will be impacted through the teachers who participated in this course. One teacher remarked, "I am so impressed by and grateful for the resources…[this is] a great start to my own science teaching journey," while another stated, "It was tough to let go of our Spring Break days at first, but this was more than worth it!"

Energy Industry Workforce Development and Vocational Training

Hawai`i Energy Fellowship Program

To date, Hawai'i Energy has employed more than a dozen young professionals in year-long, competitive fellowships intended to give challenging real-world experience in the high impact and growing field of clean energy. Through its continued collaboration with Kupu Hawai'i, the state's leading nonprofit for conservation and youth education, Hawai'i Energy fellows gain skills related to program coordination, technical skills in lighting and HVAC, research methods and analysis and more. In PY17, Hawai'i Energy sponsored a fellow who provided valuable support in Business, Marketing and Transformational projects in its downtown office as well as a fellow embedded at the University of Hawai'i's Office of Sustainability working on energy-related projects. This year's in-office fellow joined three predecessors in being offered full-time employment upon the completion of her fellowship; while the UH Office of Sustainability fellow was hired upon graduation as a mechanical engineer with the U.S. Navy.

Fellows worked on a variety of initiatives including:

- Supporting Hawai‘i Energy’s Small Business Direct Install Lighting (SBDIL) program, performing a total of 74 post-inspections across O‘ahu, representing savings of 2,112,105 kWh;
- Researching energy-saving opportunities across the UH Mānoa campus and comparing energy use intensity over time across all O‘ahu campuses in the UH system;
- Providing analysis of UH Mānoa campus rooftop solar opportunities and probable output for the Board of Regents.

Energy in Decision-Making

Continuous Energy Improvement (CEI)

In PY17, Hawai‘i Energy continued its CEI pilot program efforts. The objective of the program was to provide 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.

Recognizing the critical importance of building a strong foundation, the Program contracted with Vermont Energy Investment Corporation (VEIC) to assist with program implementation. Collaboration with VEIC enabled accomplishments in the following milestones in PY17:

1. ***CEI Framework Development***

Hawai‘i Energy continued to work with VEIC to narrow the focus to more closely align with the approach of Continuous Energy Improvement (CEI) programs. This more focused approach targeted selected customers to engage on the following activities:

- Curriculum, energy modeling and simplified marketing material development;
- Individual and onsite CEI workshops and trainings;
- Pre/post energy data modeling support and analytics;
- Energy coaching support services;

Participants were identified based on key characteristics which included the customer’s energy intensity footprint, being in a sector that would benefit from a CEI program and previous engagement with Hawai‘i Energy programs.

2. ***Creating Tools and Resources***

Tracking energy usage, projects, and progress is an important aspect of CEI. As part of the framework, Hawai‘i Energy developed a set of tools and resources to assist 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 that were developed and distributed 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

In PY17, Hawai'i Energy continued efforts with the Kamehameha Schools and the University of Hawai'i. Both institutions have the following characteristics suitable for a CEI program:

- 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 educational institution identified a Sustainability Manager as a point of contact for communication to provide useful insight into the design of the CEI program.

Two other organizations also participated in the CEI program in PY17. Maui Divers Jewelry, a manufacturing and retail facility and Hyatt Place Hotel in Waikiki, a mid-size hotel with average occupancy of 90% throughout the year. The CEI program was customized for each participant since both organizations faced barriers unique to their operational and behavioral environment. A thorough understanding of those barriers were addressed in the development of their CEI program.

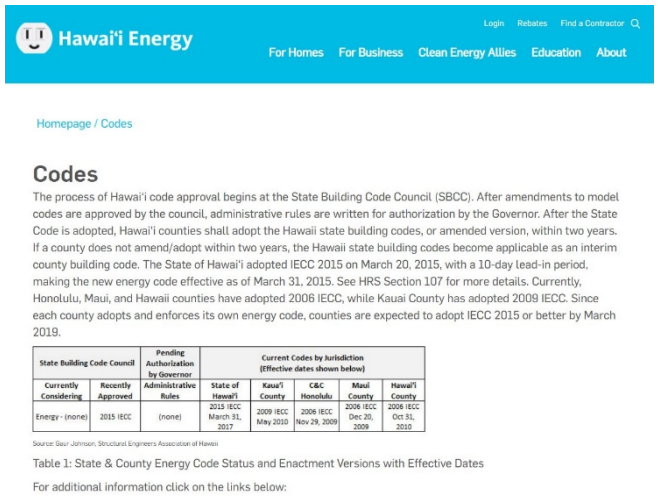
FirstFuel Reports

Hawai'i Energy worked with FirstFuel to perform more advanced data analytics in PY17. 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 9,000 customer accounts. In PY17, the reports included benchmarking analytics to compare customers within a specific market sector to similar customers within a designated zip code. This provided a comparable insight of the customer's energy use and to motivate the customer to implement attainable energy efficiency measures within their facility.

While FirstFuel's report efforts have demonstrated the potential for increased customer engagement, similar benchmarking and energy usage reports may be generated by in house data analytics. In house data analytics may be utilized to generate reports such as utility data analysis to create a benchmarking model and evaluate Hawai'i Energy's participation data to develop recommendations for energy efficiency measures.

County Adoption of 2015 IECC Support

After the new code was signed into state law on March 31st 2017, the Program initiated several efforts to encourage the counties (who have home rule, or governance over their own jurisdictions) to adopt the new code with its Hawai'i specific amendments, and make further county-specific amendments, as long as they do not weaken the provisions.



The Program also created a webpage for energy codes as a one-stop resource for designers and engineers. It includes compliance studies, checklists, code summaries and more, all of which can be found at Hawaiienergy.com/codes.

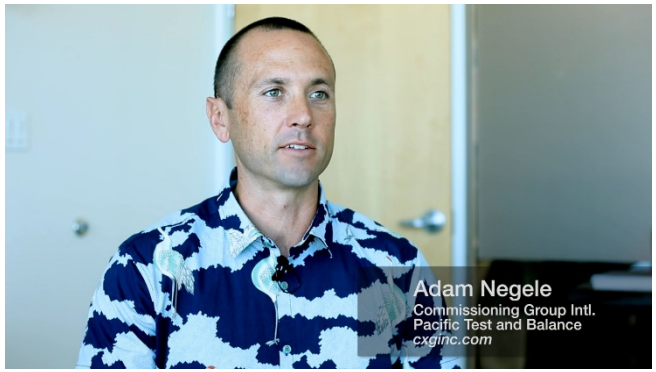
Starting with the Mayors of each county, the Program issued letters of support, commending them for their efforts and commitment thus far toward a sustainable future, and strongly recommending county adoption of the new code.

Targeting designers, planners and engineers, the Program worked with Blue Planet Foundation on a codes print piece designed to utilize information pamphlets from the previous year and target distribution to related industry professionals. A mailer that was sent out included print pieces, checklists for designers and reviewers, as well as a thumb drive with all materials in digital file format.

In partnership with the Hawai'i State Energy Office (a division of the Department of Business, Economic Development, and Tourism), the Program also helped to sponsor nine free codes trainings across the main islands in April 2018. The trainings were well attended, with over nine hundred participants across the islands from the design and construction community and the government sector. Due to the unfortunate flooding on Kaua'i, a follow-up web presentation was done. The circuit training covered both residential and commercial code provisions, with focus on changes from the existing 2006 IECC code.

Code Compliance Videos

As mentioned in the Professional Development section, one of the biggest areas of non-compliance as identified in the 2015 compliance study issued by the Program was commission/retro-commissioning. In order to target the weakest area of code compliance, the program worked with Blue Planet Foundation to create two videos; a humorous video to appeal to building owners as to the necessity of retro-commissioning, and a more technical instructional video on the actual steps and in retro-commissioning that a commissioning professional would take, and the systems involved. It had been identified as a barrier that building staff and facility managers had difficulty in presenting or pitching retro-commissioning to the boards, owners or management of their buildings. Empowered with videos as another tool, these materials will explain to building owners what retro-commissioning is and why it can yield financial savings and improved environmental performance.



A snapshot of the video created with Blue Planet Foundation featuring customers and industry professionals sharing why code compliance matters.

Legislative Support

Hawai‘i Energy worked with Blue Planet Foundation (BPF) to hold 29 advocacy events for energy efficiency legislation and engagements for 2015 IECC adoption at the county level. The efforts were classified into three categories: Legislative testimony and bill introduction, Policy information briefings, and media outreach.

Legislative Testimony and Bill Introduction

The Program supported numerous energy related bills in the 2017 legislative session by submitting written testimony and attendance of hearings in person. The bills of primary focus were relating to fixing the solar water heater variance issue (HB2109, SB2283, SB2934) and new to this session was appliance standards (HB1803 (federal), SB2935/HB2248 (California-based)). The Program was also part of discussions of draft legislation based off of the Appliance Standards Awareness Project's (ASAP) model bill in comparison to the draft bill adopting California's Title 20 standard. A takeaway from such discussions was the recommendation that administrative burden on governmental agencies would be minimal if the state appliance standard mirrored those of California's. A recommendation from Blue Planet is to combine the language of the bill for federal appliance efficiency standards with the state appliance standard bill to avoid split prioritization that was observed in the 2018 session. Although neither of these bills passed this session, appliance standards were introduced for the first time this year and more education and outreach to stakeholders is anticipated before next year's session.

Policy Information Briefings

In order to strategize and understand the political landscape, Blue Planet Foundation, under contract with Hawai‘i Energy, met with nine Senators and Representatives to discuss energy efficiency bills at the state legislature. Tying back to 2016 Hawai‘i Energy Code, BPF also met on five different occasions with City and County of Honolulu Department of Planning and Permitting to discuss feedback on the 2015 HEC from the Corporation Council. As well as with the Maui Corporation Council, Maui County managing director and the Maui Department of Public Works to discuss Hawai‘i Energy Code adoption.

Media Outreach

As part of its work for Hawai‘i Energy, BPF held editorial board meetings with major media outlets to engage in discussion around energy efficiency policies at the state legislature. Major media outlets include Pacific Business News, the Star Advertiser, Civil Beat and Hawai‘i Business magazine.

Investigative Committee for Energy Efficiency Codes Coordination (EECC)

The Program successfully led four State Building Code Council Energy Efficiency Code Coordination (EECC) committee meetings where stakeholders and attendees were able to discuss various topics that were identified by the program to be of interest and importance. A standing topics in these meetings were primarily the status of 2015 IECC adoption by the counties; the major outcome of the investigative committee was the coordination for support of county adoption of the 2015 International Energy Conservation Code (IECC 2015). Another standing topic identified to be of interest was steps toward net-zero buildings in Hawai'i. Other topics involved legislative updates and planning regarding energy-related bills that attendees were involved with. Bills such as the solar water heater variance bill, which would have modified the exemption for gas water heating, and one which would have implemented state-level appliance standards, were the main focus of this past legislative session. The investigative committee for EECC will continue to meet and engage with stakeholders to address items in Hawai'i's energy climate. Hawai‘i Energy looks forward to continue collaborative efforts and welcomes additional feedback and input in further developing these meetings.

Clean Energy Collaboration

In PY17, Hawai'i Energy hosted its first interactive stakeholder meeting to inform program design and PY18 planning efforts and beyond. Facilitated by the Elemental Excelerator, attendees included representatives from the Consumer Advocate, Aloha United Way, Maui Economic Development Board, Hawai'i Green Growth, O'ahu Economic Development Board, PUC, HECO, HNEI, Blue Planet Foundation, Ulu Pono, Kamehameha Schools, Chamber of Commerce Small Business Program, EPA, City and County of Honolulu, HCATT and DERC. Through these efforts we were able to identify key initiatives resulting in a few projects that Hawai'i Energy will test in PY18 to drive energy efficiency and economic growth, improve resiliency, and enable a 100% clean energy future.

Throughout the year, Hawai'i Energy built on the successful Collaboration Framework established in PY16 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. Integral to these efforts are the Companies participation in the Technical Advisory Group (TAG) meetings to provide input for future planning processes. Notable accomplishments in PY17 included:

- Through presentations at Hawaiian Electric Company's (and Hawai'i Electric Light Company's) Low-Income Focus Group meetings, an opportunity emerged for Hawai'i Energy to attend both the Kona and Hilo Faith-Based Summits to End Family Homelessness on Hawai'i Island to present hard-to-reach programs. The summits aimed to help homeless families with children to transition into permanent housing by using facilities such as churches to offer a safe place for these families. The goal was to sign up to thirteen partner churches, and Hawai'i Energy pledged to donate ENERGY STAR® refrigerators to all the host facilities. (See Transformational Program Community Stakeholder Impact section for more details.)
- Working together to help a historic Honolulu church reduce its electric bill by two-thirds is the focus of a collaborative case study video produced by Hawai'i Energy and HECO. Built in 1924, Christian Science Church in Makiki now features a brighter and cooler environment for parishioners to enjoy. The money saved through energy efficiency allowed the church to focus its resources on its true mission: helping those in need.
- Hawai'i Energy reached hundreds of local families at HECO's 14th annual Clean Energy Fair at Kahala Mall. As part of National Energy Action Month in October, Hawai'i Energy worked to spread the word on the vital role energy efficiency plays in our state's move toward a 100% clean energy future and our ongoing effort to be sustainable.
- Hawai'i Energy and HECO teamed up through their social media platforms on a regular basis to amplify and cross promote their respective energy efficiency messaging and events. The digital activity has shown to be mutually beneficial as it provides additional, meaningful content to audiences, while increasing the number of views of materials.
- Hawai'i Energy is a standing contributor to HECO's monthly *Smart Business Central* eNewsletter. During PY2017, topics included hotel room energy management systems, submetering systems in business facilities, and explaining the savings a small business can secure by replacing old lights with LED lights.
- An "Understanding Your Bill" workshop in August for Hawai'i Energy's CEAs to gain a better understanding of the electric bill rates and how to better assist customers with calculating paybacks for energy efficient equipment retrofits based on current rate designs.
- Joint technology investigative efforts were undertaken in many fronts from solar water heating using grid tied PV panels, DR capabilities with VRF air conditioning in small to medium businesses in cooperation with the Electric Power Research Institute (EPRI), to smart thermostats.

- A new smart thermostat rebate offering was launched at the end of the year after consultation with the utility confirming communication standard requirements to allow customer participation with future DR programs. (See Smart Thermostats under the Residential Program – REEM section for further details.)
- Discussions regarding avoided cost treatment and system loss factor calculations as pertaining to the value of energy efficiency in an ever evolving and changing electrical grid. As more and more renewable energy is incorporated as supply resources, the time and locational value of energy efficiency becomes a significant factor in valuation. These discussions are a significant and continuing dialogue amongst the parties that will continue into future planning cycles.

In addition, in PY17, Program Energy Advisors continued to collaborate with Hawaiian Electric, Maui Electric and Hawai'i Electric Light Company's Commercial Account Managers (CAMs) to assist businesses. Highlights include:

- Small businesses saving energy across all three counties from referrals between Energy Advisors and HECO, HELCO and MECO CAMs
- Hawai'i County Energy Advisor provided a rebate for a new construction industrial plant that was referred by HELCO CAM
- Tag-team support for Honolulu hotels by assisting customers together at forum meetings and sharing contact information for the newest facility managers
- Hawai'i Island Energy Advisor participated in HELCO talk story sessions
- Information regarding highway LED lights provided directly to HECO CAM overseeing State utility meters

Also in PY17, Hawai'i Energy introduced the Advanced Home Energy Insights Study (Study) to research the costs and benefits associated with emerging technologies that identify patterns of usage and easily engage users with energy-saving insights through smart phone applications. Utilizing a Sense home energy monitor to detect and track energy usage at the home, the Sense monitor analyzed changes in current and voltage at micro-second intervals using a household Wi-Fi connection and reporting real-time energy use from a web interface or iOS/Android application. Sense automatically identifies unique power signatures ranging from household appliances to portable devices and converts the information to find opportunities which may reduce energy usage, even detecting possible malfunctioning appliances. Data is used to assess energy savings costs and benefits associated with home energy monitoring products and to explore how better to serve customers with relevant, timely, and actionable energy information and services. This data will be shared with the utility on an aggregate basis to help inform end use profiles and inform whether customer end uses can provide grid services via a DR program. (See Transformational Program Innovation and Emerging Technology section for more details.)

Innovation and Emerging Technologies

Emerging energy-efficient technologies often drive innovation forward and disrupt markets to challenge the status quo. Many of these technologies may have the potential for significant energy savings but for various reasons have not achieved market adoption, whether they haven't been fully vetted through a rigorous proof of concept process, the lack of data analysis or case studies, or have not yet become commercially viable in the open market. Emerging technologies may include prototypes, pre-commercial or recently commercialized equipment, as well as software, design tools, or energy services. (See Residential CREEM section for information on the Advanced Home Energy Insights Study.)

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 PY17 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 and continued to consult with an advisory group to increase feedback for program improvement. CEAs were supported by a dedicated Business Alliances Manager. The Clean Energy Ally program hosted educational, technical, and professional development trainings as well as networking events with CEAs and potential customers.

Continued expansion of program activities and an increase in participation led to energy savings of 56,982,050 kWh in PY17. In recognition of thee CEAs that frequently participated in the Program, the "Energy Insiders Rewards" program was launched in PY17. Structured in a fashion similar to airline and hotel awards programs, Energy Insiders receive special rewards for achieving high levels of participation in the program. Some of the benefits included a $1,000 incentive bonus for use with one of their customers and status designation and premier listing of their company as a "Golden Pluggy" CEA in the program website directory.

Clean Energy Ally Program Kick-off Breakfast

107 of Hawai'i Energy's Clean Energy Allies and special guests gathered on July 19th for the annual Clean Energy Ally Kickoff Breakfast. The event provided a collegial atmosphere and a valuable opportunity for Allies to hear important updates, including incentive updates, for the current program year, network with industry colleagues and the Hawai'i Energy team, and engage with a distinguished customer panel including Mariah Dailey, General Manager of the Equus Hotel, Tony Moiso, Director of Facilities Management at Pali Momi Medical Center, and Ernie Nishizaki, CEO of Acumen Advisors, LLC. The panel shared their insights and perspectives on decision-making and successful execution of energy efficiency projects across several sectors. Attendees also heard from keynote speaker Joshua Stanbro, the Chief Resilience Officer for the City and County of Honolulu, and learned about the sustainability initiatives the new Office of Sustainability will be pursuing – many of which involve the role of clean energy and mitigating the impact of climate change across our islands. A special small-group feedback session with Hawai'i Energy staff and advisors gave Allies the opportunity to offer input and suggestions for future program offerings and activities and share what impact the Clean Energy Allies program has had on their businesses.

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 PY17, Hawai'i Energy had the opportunity to address concerns about the reduced incentives and new programs head-on while emphasizing the program support and robust resources that are still available to them.

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. Being engaged with 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 sales courses or technical trainings to stay aware of leading edge best practices and technologies.

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 allies participating in the Lighting Distributor Instant Rebate program 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. Allies have expressed appreciation for the clear communication and enhanced training that assists them to submit projects more accurately and quickly.

For the Residential Program, Hawai'i Energy staff held multiple solar contractor meetings and visited 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. The agenda also included information provided by the staff from the Green Energy Market Securitization (GEMS) loan program for the purchase of energy-efficient appliances.

In addition, Hawai'i Energy continued to employ an online training platform to broadcast information to residential CEAs. In its second year, the air conditioning (AC) Tune-Up program utilized online trainings via webinars to provide scheduling flexibility while still maintaining effective two-way dialogue when onboarding new clean energy 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. As a result of increased program awareness and training flexibility, there was a five-fold increase of AC contractor participation from the previous program year.

Communication

Keeping in touch with Trade Allies has been a top priority and in PY17, Hawai'i Energy continued having a full time Business Alliances Manager, charged with implementing the communication and coordination of the Clean Energy Ally program. The Business Alliances Manager provided Clean Energy Allies with personalized attention and guidance on Program offerings. Personal phone calls with Clean Energy Allies were 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 was 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 continued with the 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 streamlined application processes and influenced the types of trainings offered.

On a large scale, mass email marketing proved to be an effective tool for reaching Allies. A monthly newsletter "Clean Energy Ally Connection," launched in PY16, continued to inform 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 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 that originated from directory leads.

By helping to cover costs for Clean Energy Ally companies, the Program empowers Allies to invest in advertising (sample ad shown here) to grow their business while receiving added exposure to customers.

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

Co-op event funding also subsidized educational offerings incorporated into other industry events such customer focused "lunch and learns," professional association meetings (Illuminating Engineering Society/IES, American Society of Heating, Refrigeration and Air Conditioning Engineers/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.

A successful co-op event was hosted by Carrier Hawai'i to educate customers, contractors and designers on the latest U.S. Department of Energy compliance requirements, variable speed drive screw chillers and chiller refrigerants of the future. This seminar targeted aspects of chiller technology and opportunities for energy efficiency.

Hawai'i Energy market transformation funding supported ASHRAE Hawai'I Chapter to present a technical seminar for healthcare facilities focusing on building wellness. The seminar covered topics ranging from latest trends in airflow management, risk mitigation and improving thermal comfort while safeguarding energy efficiency. The seminar targeted architects, engineers, design build contractors, energy consultants, HVAC sales professionals, and facility managers.

Networking

In order to facilitate projects through customers to trade Ally interaction, the program offered multiple networking opportunities. The Program designed and hosted events for the fifth year with the Chamber of Commerce Hawaii. Through the sponsorship, Hawai'i Energy launched a partnership with Innovate Hawai'i to promote energy efficiency investments to manufacturing business owners. Hawai'i Energy also sponsored the Chamber's "Step Into Spring" networking event. Networking opportunities are popular with our Clean Energy Allies for cross-promotion of energy efficiency products and services with other Allies, and provides an opportunity to meet new potential customers in Hawai'i's business community.

In PY17 Hawai'i Energy continued to sponsor "Cup of Joe" coffee hours to deepen relationships with trade allies, answer program related questions and facilitate customer and trade ally interaction. Coffee hours for allies and customers in specific market sectors such small hotels and hospitals, were a success as they provided an opportunity for allies and customers to informally "talk story" about the issues and challenges customers face and the potential solutions the industry has to offer for these challenges.

Professional Development and Technical Training

Hawai'i Energy sponsored a "Professional Sales Development for HVAC and Energy Efficiency Professionals" course. Led by Mike Hedge, this sales training is designed to help industry sales people improve their sales ability and market penetration. Mr. Hedge is a Certified Energy Manager (CEM), Certified Energy Auditor (CEA), Efficiency Sales Professional (ESP) and holds a Hawai'i Contractors license in C-52/AC & Ventilation. The four-hour course laid out the fundamentals of efficiency sales as well as making the financial case for upgrades.

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. A variety of subject matter technical training, funded through the Transformational budget and ranging from lighting, HVAC, Practical Building Energy Management Practices to Retro-commissioning were offered in PY17. Keeping the allies informed and updated in the vast fields of energy services widens the CEA's knowledge to advocate their energy efficiency services and impact operations of small to large scale facility customers.

MARKETING & COMMUNICATIONS

This section outlines the marketing and communications work dedicated to overall Program branding and awareness in PY17. To read about the initiatives related to specific resource acquisition and market transformation goals, please review those respective sections of the Report.

Overview

PY17 marked an incredible step forward in the program's marketing and communications efforts. Having spent the last year researching and preparing, the Program went public with a new brand campaign that included several major initiatives and exciting opportunities to reach a larger and more diverse audience. These initiatives included a multi-channel advertising campaign, a redesign of the Hawai'i Energy website, and the debut of "Pluggy", Hawai'i Energy's mascot. Crucial to this effort's success was expanding the marketing and communications team to include a junior-level outreach coordinator and a focus on increasing the scale and quality of our outreach efforts by hosting several large community events, including the inaugural Innovation Symposium. Overall, Hawai'i Energy continued its mission of bringing energy efficiency to the forefront through enhanced digital content, collaboration with energy/sustainability industry and government stakeholders – and even culminated the year by being named one of Hawai'i's Best Places To Work.

Brand Campaign

PY17 marked the last phase of the execution process that began in collaboration with creative partner Wall-to-Wall Studios more than two years ago. As discussed in the PY17 Annual Plan, a recent study completed by the Hawai'i Public Utilities Commission stated that an average of 47% of constituents had not heard of Hawai'i Energy. While this result compares favorably to other jurisdictions that offer and promote comparable efficiency programs across the country, the Program's ability to achieve its energy goals largely depends on building trust with customers and remaining top-of-mind.

Figure 13
Current Phases of Hawai'i Energy Branding Campaign Execution

Phase 5 – Deploy
Wall-to-Wall will finalize the deliverables and prepare for production and launch strategy.

Furthermore, as media consumption methods evolve with technology, brands must work harder than ever to stand out. This is especially true in Hawai'i's energy sector, where brands and services can appear to overlap. Thus, Hawai'i Energy's brand campaign was designed to shift away from the traditional structure of prioritizing product purchases and rebates. This campaign focused on making Hawai'i Energy memorable, popular, and trustworthy enough to impress upon the consumer, so that when the time comes to consider efficiency, Hawai'i Energy is their resource.

Advertising

The largest, most public-facing element of the campaign was a three-month, multi-channel advertising buy, targeted at adults (aged 25-54) living in Hawai'i. Our advertising strategy was focused on reminding Hawai'i residents that Hawai'i Energy is an available, accessible resource, and trying to shift behaviors and thinking through impactful, disruptive messaging. With a limited budget, the Program relied on the expertise of creative agency Wall-to-Wall Studios to coordinate ad placements and solidify added-value opportunities to capitalize on the momentum of the campaign.

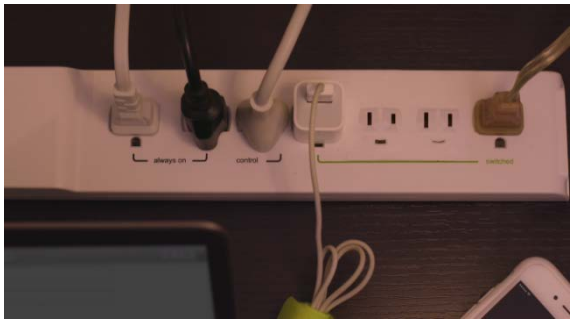
Elements of the campaign included:

- A series of four (4) 30-second commercial spots airing on all major local news networks (KGMB, KHNL, KITV, KHON) and Oceanic Cable, as well as "before-the-movie" pre-roll in 86 theater screens across Hawai'i, Honolulu and Maui counties.

- Four (4) 15-second commercial spots, designed for and distributed on Facebook and as pre-roll on websites targeted through keyword or audience relevance.
- Five (5) 4-5-minute live, on-air interview segments on local lifestyle show *Living808*, featuring Hawai'i Energy staff and highlighting various rebate programs.
- Out-of-home billboard-type displays at Ward Entertainment Center, Ala Moana Shopping Center and Pearlridge Center.
- One special event opportunity at Tamarind Park in downtown Honolulu, which the Program utilized during Energy Action Month (October) to engage and educate the public on energy efficiency through games, interactive activities, giveaways and team canvassing.

The Program launched its campaign with an intimate pau hana event in mid-August, offering several of our valued stakeholders and industry collaborators a first look at the campaign elements and encouraged them to share on their social media and other communication platforms. In addition to providing a networking space, the event allowed Hawai'i Energy to share the story of how the campaign came to be – from concept to production – and test public reactions to the various elements.

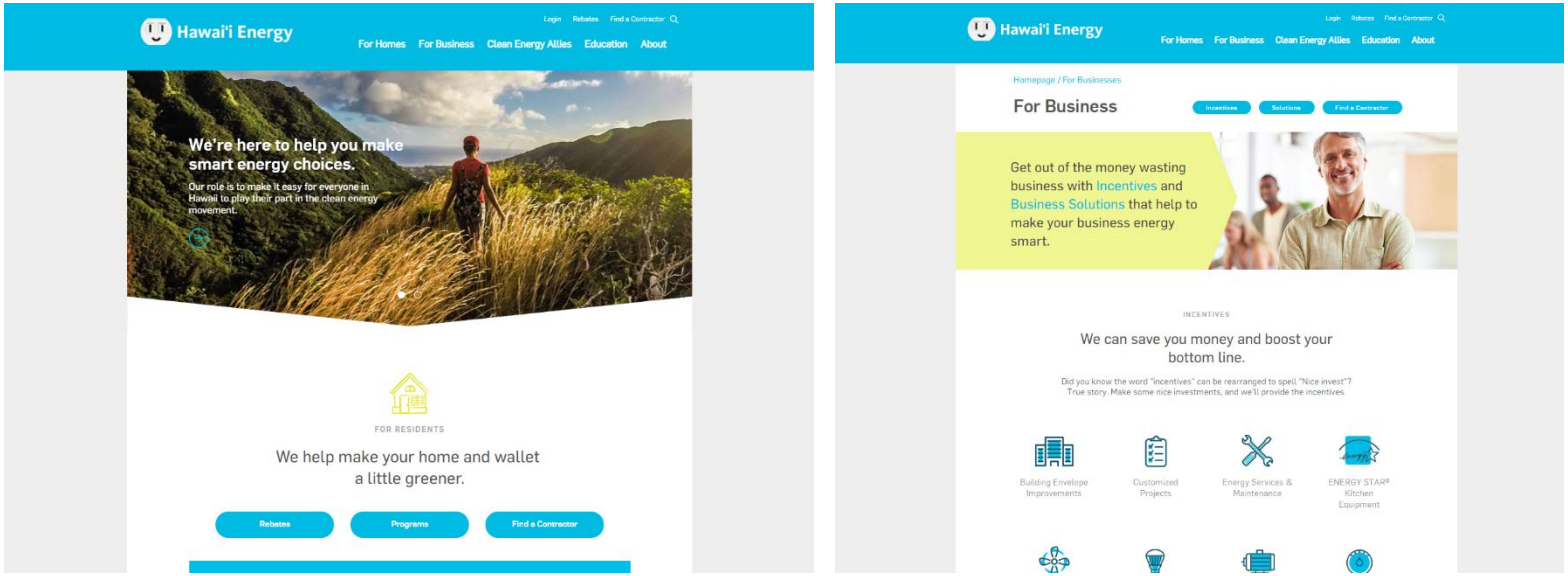
In all, the commercials aired over 1,700 times on television (including bonus spots provided free from the stations), played to over 418,000 movie-goers, and reached over 2 million impressions online with an incredible average video completion rate of 77%. The digital ads, in turn, generated over 5,000 visits to the Hawai'i Energy website. These runs combined with the exposure of the out-of-home billboards, community event and the five on-air segments on Living808 helped to generate the highest reach and awareness numbers in the Program's nine-year history.




The ad campaign focused on bringing our logo and "the outlets" to life through animation. As one of the most recognized components of our brand and something that is found in every home and business, the campaign put a heavy focus on "the outlets". This was also the most cost-effective approach by eliminating the need for any actors for these or future ads, as well as the flexibility to create other educational communications relatively easy through the outlets.

Website Redesign

Another major component of the brand campaign was a redesign of the Hawai'i Energy website. After reviewing statistics and feedback provided by staff, customers and trade allies, the website was reorganized to provide a more streamlined, simplified experience. Everything from the availability of information on the homepage to photography to the voice and tone of textual information was developed to align with Hawai'i Energy's new brand identity, as well as to make accessing the most popular pages and information easier for the customer.



The refreshed design of the Hawai'i Energy website combines compelling photography, clean and modern layouts and a revised color palette with simplified navigation. At left, the new homepage design right away shares the mission of Hawai'i Energy while visually encouraging viewers to scroll (especially while on mobile devices) to learn more about specific rebates and educational program. On the right, the new main page for business rebate information.

The intent with the ad buy was to drive consumers to the website quickly and easily, so all the ads pointed to the new website. Coupled with ongoing promotional messages generated by our in-house team, traffic on the website nearly quadrupled over the previous year, reaching over 193,000 visitors (with a majority being new). The top ten most-trafficked pages were those with residential rebate information.

In conjunction with the design overhaul, the marketing and communications team was also heavily involved in the development and launch of a new website portal for Clean Energy Allies. This was a completely new space designed to provide Allies easy access to program resources and simplify, yet elevate, their overall experience with Hawai'i Energy. In the portal, Allies can download incentive applications, marketing materials and easily update the business information which is listed on the contractor directory.

The Program informed Allies about the portal through a strategic email campaign segmented into groups: 1) current, engaged Allies, 2) inactive Allies and 3) potential new Allies. Current Allies were encouraged to re-engage with the website (or re-register if they had been inactive for two or more years), and were provided with instructions on how to utilize the new features. New Allies are directed through an onboarding process (which shifted from live webinars to an online, self-service model in the portal), for which the Program created an introduction and training video.

Pluggy

The Program developed the concept of a mascot a couple of years ago, and PY17 was the year "Pluggy" came to life. Fun, helpful and happy, Pluggy brings to life one of the most recognizable and featured element of our brand while providing opportunities for physical interaction and engagement with audiences. Features such as an aloha shirt, an oversized head and body parts made of soft material were thoughtfully incorporated to ensure that Pluggy would be appealing and accessible to a local audience of all ages, while still maximizing movement and comfort for the human operator.

Pluggy is an especially useful catalyst for bringing energy efficiency messaging to younger audiences. He made appearances at numerous community events throughout the year (including Energy Action Month at Tamarind Park and the annual Diamond Head Classic basketball tournament) and also made his television debut on Living 808. In addition to becoming a popular figure in Hawai'i Energy's social media and video content, Pluggy is also the featured character in the Program's "Efficiency Unlocked" interactive website environment (see Transformational section for more details).

Supporting Communications

Social Media

The Program spent a considerable effort this year researching and refining its social media strategy, which includes content distribution on three primary platforms (Instagram, Facebook and Twitter) and focused on engaging and retaining our follower network through high-quality, thought-provoking, relevant content. Social media was also used as a low-cost way to extend the reach of branding content, driving followers to visit the Hawai'i Energy website and/or view videos throughout the year.

Recognizing viewers' statistically short attention spans, the team experimented with a varying frequency of posts, topics and styles to keep content fresh and interesting. Program incentive promotion was mixed with educational content, tie-ins to relevant pop culture events (sports, holidays, local news, etc.), behind-the-scenes looks at Program operations, event announcements and several cross-promotion campaigns with like-minded organizations such as Blue Planet Foundation, Elemental Excelerator, and the Maui Energy Conference.

With its added investment and staffing, the Program was able to achieve the following milestones for its social media platforms:

- Grew Instagram follower network to 2,170 followers, a 67% increase over PY16.
- Increased the total reach and impressions of content on Instagram by 79% and 80%, respectively, as compared to PY16.
- Garnered an average of 15,000 impressions per month on Twitter
- Boosted average post engagement on Facebook by 11.7% over PY16 while maintaining a steady follower growth throughout the year

Hawai'i: Energized!

The Program continued its budding web series *Hawai'i: Energized!*, which aims to make energy efficiency content accessible, relevant and interesting for the everyday person. This season included three full-length (5-6 minute) episodes and several shorter marketing vignettes for social media and email distribution – all scripted, filmed and edited completely in-house. The episodes showcased a variety of topics, including energy efficiency projects at businesses across the state, "mythbusting" common energy-saving suggestions, and sharing some of the "behind-the-scenes" of Hawai'i Energy's operations and team members to humanize the brand.

The Program varied the format of the show in this second year, experimenting with different lengths, segment styles, and distribution tactics and soliciting viewer feedback to design a show that ultimately remains popular and engaging for the public. Some of the format changes for PY17 included:

- Limiting episodes to 5-6 minutes, trying to captivate audiences within the first few seconds and get viewers to watch all the way through.
- Designing production to provide as much value as possible to the featured guests – in most cases footage was repurposed into "extended cuts" that included scenes not able to fit into the episodes, and was packaged so that guests could share the segments with their networks. In turn, this allowed the Program to also build out its video case study library, which continues to be a valuable tool for customer outreach.
- Utilizing a multi-channel approach to distribution that included publishing the video on HawaiiEnergy.com, YouTube, Vimeo and Facebook, drawing traffic via mentions on social media, e-newsletters and Hawai'i Energy email signatures; and paying to boost exposure on Facebook.

Collectively the videos received over 800 views and 10,900 impressions on Facebook, with those numbers continuing to grow as word about the show spreads. At the end of the year, the show accepted an offer to become a monthly segment on Living808, which will help to expand our messaging to over 50,000 people each month.

Media Features & Special Campaigns

The Program also had several special opportunities this year to bring energy efficiency to a mainstream audience through partnerships with local and national organizations.

Hawai‘i Energy once again led local awareness initiatives for the national Energy Action Month and Energy Efficiency Day (Oct. 5) campaigns. Team members participated in several community outreach events throughout the month – including hosting our own educational event in downtown Honolulu – promoted the cause through social media and email campaigns, and secured county proclamations of Energy Efficiency Day in Hawai‘i, Maui, Kaua‘i counties and the City & County of Honolulu. The Program also utilized national ENERGY STAR® marketing materials to encourage local consumers to purchase certified appliances and electronics as well as participate in the national ENERGY STAR® pledge as part of the month-long campaign. Because of these efforts, the Program received media coverage of Energy Efficiency Day on KHON2 morning news and was recognized for outstanding contributions by the national organizers.

Hawai‘i Energy hosted an public event in celebration of Energy Action Month during a busy lunch hour in downtown Honolulu, featuring educational displays, a “Guess The Refrigerator Age” game, appearances by Pluggy and raffle prizes all themed around energy efficiency.

The Program also utilized new media company Blackletter Group to produce a 16-page custom energy efficiency-themed insert for Hawai‘i Business Magazine titled “Our Green Future” which ran in the January 2018 print issue as well as on the magazine’s website, e-newsletters and social media. The Program funded this insert through a special co-op advertising offer to Clean Energy Allies, where they received a full or half-page profile in the insert at a discounted rate. Their participation allowed Hawai‘i Energy to include more educational content while adding value to their membership. Furthermore, because of the success of this insert, Hawai‘i Energy was also approached to provide efficiency content for the magazine’s spring “Green Hawai‘i" insert (in collaboration with Hawaiian Electric Company) that spotlighted overall energy industry progress.

Awards & Recognitions

Hawai'i Energy ended the year by receiving several recognitions related to marketing and communications work in PY17.

Creative agency Wall-to-Wall Studios received multiple awards at the American Advertising Federation Hawai'i Chapter's annual Pele Awards for elements produced for Hawai'i Energy's brand campaign. The Pele Awards is one of fifteen National District Competitions for the American Advertising Awards (also known as the ADDYs) that recognize excellence in advertising and design in the state of Hawai'i for the past calendar year. In addition to receiving two best-in-category awards for the "Stop Energy Waste" TV campaign, the team also took home the respected "People's Choice" award, which was decided through public voting prior to the awards show.

In addition to the Pele Award recognitions, Hawai'i Energy was also selected as one of Hawai'i Business Magazine's *Best Places To Work*® for 2018. The competition is facilitated by a national evaluator who examines company benefits, culture, working conditions and overall employee satisfaction (among other criteria) through an anonymous, confidential survey. Out of tens of thousands of companies in the state, Hawai'i Energy (as part of parent company Leidos, Inc.) was recognized as one of the 70 best, earning the Program a feature in Hawai'i Business Magazine and the right to publicize this distinction in marketing materials, particularly those focused on talent recruitment. Winning this award was a huge validator of the importance of organizational culture as it relates to branding efforts, and demonstrates that Hawai'i Energy truly embodies being a fresh, fun and happy brand.

These awards are especially meaningful as it is the first time the Program has invested internally and externally on a cohesive messaging strategy – recognizing that branding goes far beyond the visual elements and requires all pieces of the Program to be in alignment with the strategy. In a time when achieving high energy savings goals requires both innovation and cost-effectiveness, this investment in branding builds a foundation moving forward for strengthening and establishing relationships with customers that we have not reached before.

Figure 14
List of Pele Awards for Hawai'i Energy's Brand Campaign

Pele Gold

- "Stop Energy Waste" TV Campaign – Overall Award for Budgets Over $50K
- "Stop Energy Waste" TV Campaign - Animation, Special Effects + Motion Graphics

Silver

- "Stop Energy Waste" - Integrated Branded Content Campaign

Bronze

- "Pennies" Floor Graphic - Outdoor Board
- "Stop Energy Waste" TV Campaign - Voice Over

Marketing & Communications Manager Shayna Doi accepts Hawai'i Energy's "Best Places To Work" award for 2018 presented by Hawai'i Business Magazine.

APPENDIX A – PORTFOLIO IMPACTS

Introduction

The PY2017 Annual Report *Portfolio Impacts* section maintains PY16 changes 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	620,081	$4,095,060	5,975	59,974,489	912,199,904
CBEEM	257	1,578	$4,026,758	4,534	30,747,340	383,973,106
BESM	18	18	$1,350	1	6,472	6,472
BHTR	2,400	69,759	$3,105,712	1,646	11,765,432	164,186,859
Commercial Total	**3,505**	**691,436**	**$11,228,879**	**12,156**	**102,493,734**	**1,460,366,342**
REEM	8,079	4,218,776	$6,555,399	12,080	64,526,172	769,169,812
CREEM	3	3	$20,350	9	69,941	344,398
RESM	4,775	4,774	$415,900	273	1,521,697	4,085,380
RHTR	2,209	34,973	$881,161	451	1,600,417	17,333,003
Residential Total	**15,066**	**4,258,526**	**$7,872,809**	**12,814**	**67,718,228**	**790,932,593**
Total	**18,571**	**4,949,962**	**$19,101,689**	**24,970**	**170,211,962**	**2,251,298,935**

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	$0.068	$0.004	$163,878,490	$42,319,422	40.0	10.3	3.9
CBEEM	$0.131	$0.010	$72,430,631	$69,927,523	18.0	17.4	1.0
BESM	$0.209	$0.209	$1,107	$5,400	0.8	4.0	0.2
BHTR	$0.264	$0.019	$32,289,393	$4,220,364	10.4	1.4	7.7
Commercial Total	**$0.110**	**$0.008**	**$268,599,621**	**$116,472,709**	**23.9**	**10.4**	**2.3**
REEM	$0.102	$0.009	$151,318,544	$44,715,393	23.1	6.8	3.4
CREEM	$0.291	$0.059	$69,856	$20,350	3.4	1.0	3.4
RESM	$0.273	$0.102	$782,802	$1,431,900	1.9	3.4	0.5
RHTR	$0.551	$0.051	$3,835,256	$945,226	4.4	1.1	4.1
Residential Total	**$0.116**	**$0.010**	**$156,006,458**	**$47,112,868**	**19.8**	**6.0**	**3.3**
Total	**$0.112**	**$0.008**	**$424,606,079**	**$163,585,578**	**22.2**	**8.6**	**2.6**

See Attachment F 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)						
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	620,081	$4,095,060	5,397	54,126,870	823,303,248
CBEEM	257	1,578	$4,026,758	4,088	27,715,069	346,155,871
BESM	18	18	$1,350	1	5,822	5,822
BHTR	2,400	69,759	$3,105,712	1,486	10,620,699	148,207,006
Commercial Total	**3,505**	**691,436**	**$11,228,879**	**10,972**	**92,468,459**	**1,317,671,947**
REEM	8,079	4,218,776	$6,555,399	10,924	58,333,863	695,392,755
CREEM	3	3	$20,350	8	62,914	309,794
RESM	4,775	4,774	$415,900	246	1,370,880	3,684,588
RHTR	2,209	34,973	$881,161	409	1,451,266	15,731,230
Residential Total	**15,066**	**4,258,526**	**$7,872,809**	**11,587**	**61,218,922**	**715,118,367**
Total	**18,571**	**4,949,962**	**$19,101,689**	**22,560**	**153,687,381**	**2,032,790,314**

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	$0.076	$0.005	$147,938,432	$42,319,422	36.1	10.3	3.5
CBEEM	$0.145	$0.012	$65,308,110	$69,927,523	16.2	17.4	0.9
BESM	$0.232	$0.232	$996	$5,400	0.7	4.0	0.2
BHTR	$0.292	$0.021	$29,148,853	$4,220,364	9.4	1.4	6.9
Commercial Total	**$0.121**	**$0.009**	**$242,396,390**	**$116,472,709**	**21.6**	**10.4**	**2.1**
REEM	$0.112	$0.009	$136,810,414	$44,715,393	20.9	6.8	3.1
CREEM	$0.323	$0.066	$62,837	$20,350	3.1	1.0	3.1
RESM	$0.303	$0.113	$706,038	$1,431,900	1.7	3.4	0.5
RHTR	$0.607	$0.056	$3,479,890	$945,226	3.9	1.1	3.7
Residential Total	**$0.129**	**$0.011**	**$141,059,180**	**$47,112,868**	**17.9**	**6.0**	**3.0**
Total	**$0.124**	**$0.009**	**$383,455,570**	**$163,585,578**	**20.1**	**8.6**	**2.3**

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
Oʻahu	115,416,718	11.17%	128,308,766	79.93%	102,553,529
Hawaiʻi Island	18,669,260	9.00%	20,349,493	81.92%	16,671,117
Maui	19,036,051	9.96%	20,932,042	80.17%	16,780,227
Lānaʻi	62,464	9.96%	68,685	90.61%	62,238
Molokaʻi	502,889	9.96%	552,976	96.41%	533,142
Total	**153,687,381**	**10.75%**	**170,211,962**	**80.25%**	**136,600,252**
Percent of Customer Level Savings			**110.8%**		**88.9%**

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
Oʻahu	16,141	11.17%	17,944	82.68%	14,837
Hawaiʻi Island	3,351	9.00%	3,653	84.27%	3,078
Maui	2,950	9.96%	3,243	82.77%	2,685
Lānaʻi	15	9.96%	16	96.76%	16
Molokaʻi	102	9.96%	113	98.38%	111
Total	**22,560**	**10.68%**	**24,970**	**83.01%**	**20,726**
Percent of Customer Level Savings			**110.7%**		**91.9%**

Table A5 Energy (kWh) Reduction by Impact and Program					
Program	**Customer Level Savings**	**System Losses**	**System Level Savings**	**Net-to-Gross Ratio**	**Program Level Savings**
BEEM	54,126,870	10.80%	59,974,489	75.00%	44,980,939
CBEEM	27,715,069	10.94%	30,747,340	75.00%	23,060,505
BESM	5,822	11.17%	6,472	95.00%	6,149
BHTR	10,620,699	10.78%	11,765,432	99.04%	11,652,589
Commercial Total	**92,468,459**	**10.84%**	**102,493,734**	**77.76%**	**79,700,182**
REEM	58,333,863	10.62%	64,526,172	83.49%	53,871,892
CREEM	62,914	11.17%	69,941	73.00%	51,057
RESM	1,370,880	11.00%	1,521,697	90.47%	1,376,703
RHTR	1,451,266	10.28%	1,600,417	100.00%	1,600,417
Residential Total	**61,218,922**	**10.62%**	**67,718,228**	**84.02%**	**56,900,070**
Total	**153,687,381**	**10.75%**	**170,211,962**	**80.25%**	**136,600,252**
Percent of Customer Level Savings			**110.8%**		**88.9%**

Table A6 Demand (kW) Reduction by Impact and Program					
Program	**Customer Level Savings**	**System Losses**	**System Level Savings**	**Net-to-Gross Ratio**	**Program Level Savings**
BEEM	5,397	10.70%	5,975	75.00%	4,481
CBEEM	4,088	10.91%	4,534	75.00%	3,400
BESM	1	11.17%	1	95.00%	1
BHTR	1,486	10.75%	1,646	99.09%	1,631
Commercial Total	**10,972**	**10.78%**	**12,156**	**78.26%**	**9,514**
REEM	10,924	10.58%	12,080	86.99%	10,508
CREEM	8	11.17%	9	73.00%	7
RESM	246	11.05%	273	90.08%	246
RHTR	409	10.38%	451	100.00%	451
Residential Total	**11,587**	**10.59%**	**12,814**	**87.50%**	**11,213**
Total	**22,560**	**10.68%**	**24,970**	**83.01%**	**20,726**
Percent of Customer Level Savings			**110.7%**		**91.9%**

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
Portfolio Energy (kWh) Program Level Impacts by Island and Rate Schedule

Island	R	G	J	P	DS	F	Other*	Total	%
Oʻahu	38,759,316	4,915,161	34,852,782	15,273,539	4,631,022	4,115,675	6,035	102,553,529	75.1%
Hawaiʻi Island	9,663,932	1,306,439	4,278,555	1,090,006	0	332,185	0	16,671,117	12.2%
Maui	7,979,279	823,135	5,316,701	2,661,111	0	0	0	16,780,227	12.3%
Lānaʻi	44,889	0	17,348	0	0	0	0	62,238	0.0%
Molokaʻi	489,478	506	43,158	0	0	0	0	533,142	0.4%
Total	**56,936,894**	**7,045,241**	**44,508,544**	**19,024,656**	**4,631,022**	**4,447,859**	**6,035**	**136,600,252**	**100.0%**
Percent	**41.7%**	**5.2%**	**32.6%**	**13.9%**	**3.4%**	**3.3%**	**0.0%**	**100.0%**	

*Other combines the less frequently assigned rate codes for PY17

Table A8
Program Demand Impact by Rate Schedule

Island	R	G	J	P	DS	F	Other*	Total	%
Oʻahu	7,512	485	3,536	2,036	645	622	0	14,837	71.6%
Hawaiʻi Island	2,053	273	506	197	0	50	0	3,078	14.9%
Maui	1,533	131	458	562	0	0	0	2,685	13.0%
Lānaʻi	15	0	1	0	0	0	0	16	0.1%
Molokaʻi	108	0	3	0	0	0	0	111	0.5%
Total	**11,220**	**889**	**4,504**	**2,795**	**645**	**672**	**0**	**20,726**	**100.0%**
Percent	**54.1%**	**4.3%**	**21.7%**	**13.5%**	**3.1%**	**3.2%**	**0.0%**	**100.0%**	

*Other combines the less frequently assigned rate codes for PY17

Table A9 Portfolio Energy (kWh) Program Level Impacts by Rate Schedule									
Program	**R**	**G**	**J**	**P**	**DS**	**F**	**Other***	**Total**	**%**
BEEM	59,200	589,325	34,773,861	7,204,267	2,345,249	3,002	6,035	44,980,939	32.9%
CBEEM	0	350,764	5,890,899	10,247,593	2,126,391	4,444,857	0	23,060,505	16.9%
BESM	342	2,733	1,025	2,050	0	0	0	6,149	0.0%
BHTR	26,655	6,073,022	3,829,044	1,564,487	159,381	0	0	11,652,589	8.5%
Commercial Total	**86,196**	**7,015,845**	**44,494,828**	**19,018,397**	**4,631,022**	**4,447,859**	**6,035**	**79,700,182**	**58.3%**
REEM	53,831,432	24,123	11,400	4,936	0	0	0	53,871,892	39.4%
CREEM	51,057	0	0	0	0	0	0	51,057	0.0%
RESM	1,367,974	5,091	2,316	1,323	0	0	0	1,376,703	1.0%
RHTR	1,600,235	183	0	0	0	0	0	1,600,417	1.2%
Residential Total	**56,850,698**	**29,397**	**13,716**	**6,259**	**0**	**0**	**0**	**56,900,070**	**41.7%**
Total	**56,936,894**	**7,045,241**	**44,508,544**	**19,024,656**	**4,631,022**	**4,447,859**	**6,035**	**136,600,252**	**100.0%**
Percent	**41.7%**	**5.2%**	**32.6%**	**13.9%**	**3.4%**	**3.3%**	**0.0%**	**100.0%**	

*Other combines the less frequently assigned rate codes for PY17

Table A10 Portfolio Demand (kW) Program Level Impacts by Rate Schedule									
Program	**R**	**G**	**J**	**P**	**DS**	**F**	**Other***	**Total**	**%**
BEEM	9	167	2,913	1,146	244	1	0	4,481	21.6%
CBEEM	0	56	921	1,377	373	672	0	3,400	16.4%
BESM	0	1	0	0	0	0	0	1	0.0%
BHTR	4	660	669	270	27	0	0	1,631	7.9%
Commercial Total	**13**	**885**	**4,503**	**2,794**	**645**	**672**	**0**	**9,514**	**45.9%**
REEM	10,504	4	0	0	0	0	0	10,508	50.7%
CREEM	7	0	0	0	0	0	0	7	0.0%
RESM	245	1	1	0	0	0	0	246	1.2%
RHTR	451	0	0	0	0	0	0	451	2.2%
Residential Total	**11,207**	**4**	**1**	**1**	**0**	**0**	**0**	**11,213**	**54.1%**
Total	**11,220**	**889**	**4,504**	**2,795**	**645**	**672**	**0**	**20,726**	**100.0%**
Percent	**54.1%**	**4.3%**	**21.7%**	**13.5%**	**3.1%**	**3.2%**	**0.0%**	**100.0%**	

*Other combines the less frequently assigned rate codes for PY17

Table A11 Portfolio Energy (kWh) Customer Level Impacts by Rate Schedule									
Program	**R**	**G**	**J**	**P**	**DS**	**F**	**Other***	**Total**	**%**
BEEM	71,766	714,378	41,844,556	8,672,522	2,812,808	3,600	7,238	54,126,870	35.2%
CBEEM	0	421,665	7,085,873	12,318,277	2,550,318	5,338,935	0	27,715,069	18.0%
BESM	323	2,588	970	1,941	0	0	0	5,822	0.0%
BHTR	24,219	5,542,857	3,486,676	1,422,133	144,815	0	0	10,620,699	6.9%
Commercial Total	**96,308**	**6,681,488**	**52,418,076**	**22,414,872**	**5,507,942**	**5,342,535**	**7,238**	**92,468,459**	**60.2%**
REEM	58,287,182	27,738	13,189	5,754	0	0	0	58,333,863	38.0%
CREEM	62,914	0	0	0	0	0	0	62,914	0.0%
RESM	1,362,393	4,929	2,264	1,294	0	0	0	1,370,880	0.9%
RHTR	1,451,101	164	0	0	0	0	0	1,451,266	0.9%
Residential Total	**61,163,591**	**32,831**	**15,453**	**7,048**	**0**	**0**	**0**	**61,218,922**	**39.8%**
Total	**61,259,899**	**6,714,318**	**52,433,529**	**22,421,920**	**5,507,942**	**5,342,535**	**7,238**	**153,687,381**	**100.0%**
Percent	**39.9%**	**4.4%**	**34.1%**	**14.6%**	**3.6%**	**3.5%**	**0.0%**	**100.0%**	

*Other combines the less frequently assigned rate codes for PY16

Table A12 Portfolio Demand (kW) Customer Level Impacts by Rate Schedule									
Program	**R**	**G**	**J**	**P**	**DS**	**F**	**Other***	**Total**	**%**
BEEM	11	204	3,506	1,382	293	1	1	5,397	23.9%
CBEEM	0	68	1,108	1,657	448	807	0	4,088	18.1%
BESM	0	1	0	0	0	0	0	1	0.0%
BHTR	4	604	609	245	25	0	0	1,486	6.6%
Commercial Total	**15**	**876**	**5,223**	**3,285**	**766**	**807**	**1**	**10,972**	**48.6%**
REEM	10,919	4	1	0	0	0	0	10,924	48.4%
CREEM	8	0	0	0	0	0	0	8	0.0%
RESM	245	1	1	0	0	0	0	246	1.1%
RHTR	409	0	0	0	0	0	0	409	1.8%
Residential Total	**11,581**	**5**	**1**	**1**	**0**	**0**	**0**	**11,587**	**51.4%**
Total	**11,596**	**881**	**5,224**	**3,285**	**766**	**807**	**1**	**22,560**	**100.0%**
Percent	**51.4%**	**3.9%**	**23.2%**	**14.6%**	**3.4%**	**3.6%**	**0.0%**	**100.0%**	

*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 Demand (%)	Program Energy First Year (kWh)	Program Energy 1st Yr (%)	Program Energy Lifetime (kWh)	Program Energy Lifetime (%)	Average Measure Life (Yr)	TRB/ TRC	Total Resource Benefit (TRB)	Total Resource Benefit (TRB)	Total Resource Cost (TRC)	Total Resource Cost (TRC)	Incentives ($)	Incentives (%)
LED Lighting	5,367	25.9%	40,407,448	29.6%	604,799,204	34.2%	15.0	4.4	$117,355,679	35.2%	$26,782,536	16.4%	$4,223,347	22.1%
LED Linear	2,205	10.6%	25,082,133	18.4%	370,344,581	21.0%	14.8	2.6	$65,313,051	19.6%	$25,376,300	15.5%	$2,792,974	14.6%
Custom Lighting	1,950	9.4%	12,986,767	9.5%	119,819,452	6.8%	9.2	2.0	$24,674,335	7.4%	$12,513,451	7.6%	$2,154,364	11.3%
LED Omni Directional	527	2.5%	6,491,931	4.8%	96,662,711	5.5%	14.9	5.0	$16,759,317	5.0%	$3,339,525	2.0%	$378,834	2.0%
Custom HVAC	570	2.7%	4,133,368	3.0%	84,236,537	4.8%	20.4	0.7	$13,861,375	4.2%	$20,024,437	12.2%	$880,674	4.6%
LED Specialty	569	2.7%	5,217,553	3.8%	77,719,358	4.4%	14.9	12.3	$14,350,367	4.3%	$1,171,401	0.7%	$916,991	4.8%
Custom	546	2.6%	3,502,197	2.6%	60,956,140	3.5%	17.4	0.3	$11,129,411	3.3%	$33,776,807	20.6%	$579,986	3.0%
Solar Water Heating	759	3.7%	2,751,912	2.0%	55,038,236	3.1%	20.0	1.4	$12,281,055	3.7%	$8,619,600	5.3%	$780,322	4.1%
Chillers	386	1.9%	2,364,431	1.7%	47,288,615	2.7%	20.0	1.0	$8,792,650	2.6%	$8,732,188	5.3%	$337,446	1.8%
Refrigerator w/ Trade In	106	0.5%	2,548,669	1.9%	35,681,371	2.0%	14.0	1.3	$5,689,161	1.7%	$4,261,200	2.6%	$532,300	2.8%
Custom - High Efficiency Lighting	446	2.2%	3,303,764	2.4%	35,051,114	2.0%	10.6	1.9	$7,009,570	2.1%	$3,730,339	2.3%	$626,745	3.3%
LED Exit Signs	205	1.0%	1,809,747	1.3%	27,082,575	1.5%	15.0	24.2	$5,042,444	1.5%	$208,380	0.1%	$139,102	0.7%
Kitchen Ventilation	253	1.2%	1,479,699	1.1%	22,195,480	1.3%	15.0	5.6	$4,644,713	1.4%	$831,150	0.5%	$357,525	1.9%
Split Systems: 15% Better Than Code	116	0.6%	1,022,389	0.7%	15,335,830	0.9%	15.0	5.1	$2,856,084	0.9%	$564,072	0.3%	$399,538	2.1%
VFD Pump for Chilled Water/Condenser Water	263	1.3%	967,749	0.7%	14,516,240	0.8%	15.0	8.2	$3,621,572	1.1%	$442,000	0.3%	$104,000	0.5%
Peer Group Comparison	4,595	22.2%	13,793,419	10.1%	13,793,419	0.8%	1.0	2.0	$2,355,225	0.7%	$1,196,304	0.7%	$1,196,304	6.3%
Custom - EMS TBD	80	0.4%	602,614	0.4%	9,039,205	0.5%	15.0	6.0	$1,755,655	0.5%	$290,700	0.2%	$90,075	0.5%
VRF Air Conditioners	167	0.8%	609,740	0.4%	5,487,664	0.3%	9.0	0.4	$1,427,416	0.4%	$3,573,123	2.2%	$124,500	0.7%
Residential Custom	68	0.3%	410,070	0.3%	5,445,439	0.3%	13.3	3.8	$1,135,890	0.3%	$301,129	0.2%	$301,129	1.6%
Split Systems: VRF	39	0.2%	358,846	0.3%	5,382,683	0.3%	15.0	1.3	$990,636	0.3%	$744,800	0.5%	$128,819	0.7%
Rid-A-Fridge (Refrigerator)	15	0.1%	378,696	0.3%	5,301,742	0.3%	14.0	21.2	$841,191	0.3%	$39,620	0.0%	$39,970	0.2%
Advance Power Strips	76	0.4%	677,354	0.5%	5,212,972	0.3%	7.7	3.7	$956,680	0.3%	$259,215	0.2%	$246,967	1.3%
Fluorescent T12 to T8 Low Wattage	35	0.2%	326,031	0.2%	4,564,431	0.3%	14.0	2.9	$845,912	0.3%	$294,187	0.2%	$19,102	0.1%
Package Units: 15% Better Than Code	37	0.2%	291,756	0.2%	4,376,339	0.2%	15.0	3.0	$836,232	0.3%	$275,323	0.2%	$189,929	1.0%
Domestic Water Booster Packages	27	0.1%	278,865	0.2%	4,182,982	0.2%	15.0	2.3	$748,532	0.2%	$324,000	0.2%	$34,880	0.2%
TV	83	0.4%	682,555	0.5%	4,095,333	0.2%	6.0	0.7	$831,765	0.2%	$1,116,606	0.7%	$107,955	0.6%
Window Film	88	0.4%	387,829	0.3%	3,878,289	0.2%	10.0	2.5	$920,315	0.3%	$366,642	0.2%	$73,339	0.4%

Table A13, cont'd TRC Measure Values														
Measure	Program Demand (kW)	Program Demand (%)	Program Energy First Year (kWh)	Program Energy 1st Yr (%)	Program Energy Lifetime (kWh)	Program Energy Lifetime (%)	Average Measure Life (Yr)	TRB/ TRC	Total Resource Benefit (TRB)	Total Resource Benefit (TRB)	Total Resource Cost (TRC)	Total Resource Cost (TRC)	Incentives ($)	Incentives (%)
Solar Water Heating Tune-up	69	0.3%	589,697	0.4%	2,948,484	0.2%	5.0	0.8	$581,645	0.2%	$696,900	0.4%	$232,300	1.2%
LED Refrigerated Case Lighting	32	0.2%	232,271	0.2%	2,711,662	0.2%	11.7	7.3	$533,248	0.2%	$72,602	0.0%	$66,804	0.3%
Whole House Fan	40	0.2%	127,391	0.1%	2,547,827	0.1%	20.0	11.0	$602,092	0.2%	$54,960	0.0%	$34,350	0.2%
Fluorescent Delamping	18	0.1%	175,525	0.1%	2,457,344	0.1%	14.0	30.3	$451,744	0.1%	$14,920	0.0%	$9,475	0.0%
Showerhead	297	1.4%	416,603	0.3%	2,083,013	0.1%	5.0	8.7	$793,122	0.2%	$90,918	0.1%	$78,285	0.4%
Clothes Washer	22	0.1%	114,486	0.1%	1,602,797	0.1%	14.0	0.8	$351,872	0.1%	$460,350	0.3%	$27,605	0.1%
Fluorescent T8 to T8 Low Wattage	26	0.1%	99,873	0.1%	1,398,219	0.1%	14.0	1.1	$346,063	0.1%	$322,500	0.2%	$10,750	0.1%
VFD Pool Pumps	4	0.0%	118,015	0.1%	1,367,947	0.1%	11.6	1.7	$222,380	0.1%	$133,350	0.1%	$29,265	0.2%
VFD - AHU	30	0.1%	86,134	0.1%	1,292,005	0.1%	15.0	6.4	$359,476	0.1%	$56,426	0.0%	$8,900	0.0%
Heat Pump Water Heater	15	0.1%	116,101	0.1%	1,161,011	0.1%	10.0	1.6	$231,794	0.1%	$145,800	0.1%	$24,300	0.1%
Clothes Dryer	16	0.1%	82,705	0.1%	1,157,869	0.1%	14.0	0.9	$257,896	0.1%	$285,500	0.2%	$18,110	0.1%
Fluorescent Delamping with Reflectors	7	0.0%	78,688	0.1%	1,101,627	0.1%	14.0	14.2	$194,379	0.1%	$13,720	0.0%	$6,860	0.0%
ECM Refrigeration	8	0.0%	72,876	0.1%	1,093,136	0.1%	15.0	16.6	$201,027	0.1%	$12,120	0.0%	$5,100	0.0%
Residential A/C	179	0.9%	793,155	0.6%	793,155	0.0%	1.0	0.2	$135,633	0.0%	$740,400	0.5%	$185,100	1.0%
Rid-A-Fridge (Freezer)	2	0.0%	43,579	0.0%	610,111	0.0%	14.0	23.5	$96,802	0.0%	$4,120	0.0%	$4,145	0.0%
Submetering (Condo)	13	0.1%	73,863	0.1%	590,906	0.0%	8.0	1.4	$132,297	0.0%	$92,000	0.1%	$27,600	0.1%
Window AC w/ Trade In	18	0.1%	65,412	0.0%	588,708	0.0%	9.0	0.9	$152,738	0.0%	$179,280	0.1%	$28,580	0.1%
Room Occupancy Sensors	7	0.0%	69,504	0.1%	556,033	0.0%	8.0	4.4	$108,530	0.0%	$24,720	0.0%	$24,720	0.1%
Custom - High Efficiency HVAC	7	0.0%	34,867	0.0%	523,000	0.0%	15.0	1.0	$116,002	0.0%	$112,500	0.1%	$15,000	0.1%
Faucet Aerator	87	0.4%	98,121	0.1%	490,607	0.0%	5.0	3.3	$213,929	0.1%	$65,051	0.0%	$56,567	0.3%
Soundbar	3	0.0%	63,011	0.0%	441,078	0.0%	7.0	1.1	$76,956	0.0%	$72,945	0.0%	$18,432	0.1%
CFL	6	0.0%	44,113	0.0%	264,677	0.0%	6.0	9.2	$55,948	0.0%	$6,052	0.0%	$1,362	0.0%
Reach-In Freezer Glass Door	2	0.0%	19,202	0.0%	230,422	0.0%	12.0	2.4	$43,955	0.0%	$18,011	0.0%	$550	0.0%
Heat Pump	1	0.0%	22,072	0.0%	220,717	0.0%	10.0	0.4	$35,953	0.0%	$91,040	0.1%	$1,837	0.0%
Reach-In Refrigerator Solid Door	2	0.0%	14,811	0.0%	177,737	0.0%	12.0	0.4	$33,925	0.0%	$83,000	0.1%	$6,600	0.0%
Reach-In Freezer Solid Door	2	0.0%	13,246	0.0%	158,956	0.0%	12.0	0.8	$30,315	0.0%	$39,000	0.0%	$2,375	0.0%
Solar Attic Fan	0	0.0%	29,278	0.0%	146,388	0.0%	5.0	0.7	$23,627	0.0%	$31,800	0.0%	$10,600	0.1%
CFL Specialty	2	0.0%	17,614	0.0%	105,683	0.0%	6.0	3.0	$22,242	0.0%	$7,300	0.0%	$6,151	0.0%
Package Units: VRF	1	0.0%	6,976	0.0%	104,645	0.0%	15.0	1.4	$21,928	0.0%	$16,100	0.0%	$2,300	0.0%
T12 to T8 Standard (2 foot lamps)	1	0.0%	5,908	0.0%	82,709	0.0%	14.0	0.1	$18,166	0.0%	$158,479	0.1%	$1,497	0.0%
Ice Machine	1	0.0%	5,755	0.0%	69,065	0.0%	12.0	1.0	$13,184	0.0%	$12,645	0.0%	$500	0.0%

Table A13, cont'd TRC Measure Values														
Measure	**Program Demand (kW)**	**Program Demand (%)**	**Program Energy First Year (kWh)**	**Program Energy 1st Yr (%)**	**Program Energy Lifetime (kWh)**	**Program Energy Lifetime (%)**	**Average Measure Life (Yr)**	**TRB/ TRC**	**Total Resource Benefit (TRB)**	**Total Resource Benefit (TRB)**	**Total Resource Cost (TRC)**	**Total Resource Cost (TRC)**	**Incentives ($)**	**Incentives (%)**
Reach-In Refrigerator Glass Door	0	0.0%	1,478	0.0%	17,740	0.0%	12.0	1.3	$3,387	0.0%	$2,576	0.0%	$400	0.0%
Kitchen Aerators	0	0.0%	391	0.0%	1,953	0.0%	5.0	6.8	$766	0.0%	$113	0.0%	$30	0.0%
Bathroom Aerators	233	1.1%	0	0.0%	1	0.0%	5.0	6,137.1	$359,020	0.1%	$59	0.0%	$9	0.0%
Accounting	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$291,779	0.2%	$370,549	1.9%
Accounting-Sales Tax	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$4,302	0.0%	$4,302	0.0%
Ladder Charge	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$17,206	0.0%	$17,206	0.1%
Non-Qualifying Equipment	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$0	0.0%	$5,632	0.0%
Other	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$0	0.0%	$425	0.0%
Recycler App - Acct. Header Record	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$0	0.0%	$0	0.0%
Total	20,726	100.0%	136,600,252	100.0%	1,766,585,174	100.0%	12.9	2.0	$333,848,273	100.0%	$163,585,578	100.0%	$19,101,689	100.0%

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 ($)**
Package Units: 15% Better Than Code	$275,323	$55,065	$220,258
Advance Power Strips	$259,215	$259,215	$0
LED Exit Signs	$208,380	$208,380	$0
Window AC w/ Trade In	$179,280	$43,560	$135,720
T12 to T8 Standard (2 foot lamps)	$158,479	$7,924	$150,555
Heat Pump Water Heater	$145,800	$145,800	$0
VFD Pool Pumps	$133,350	$109,650	$23,700
Custom - High Efficiency HVAC	$112,500	$112,500	$0
Submetering (Condo)	$92,000	$92,000	$0
Heat Pump	$91,040	$91,040	$0
Showerhead	$90,918	$90,918	$0
Reach-In Refrigerator Solid Door	$83,000	$36,655	$46,345
Soundbar	$72,945	$72,945	$0
LED Refrigerated Case Lighting	$72,602	$72,602	$0
Fluorescent T8 to T8 Low Wattage	$68,940	$1,379	$67,561
Faucet Aerator	$65,051	$65,051	$0
VFD - AHU	$56,426	$14,107	$42,320
Whole House Fan	$54,960	$54,960	$0
Rid-A-Fridge (Refrigerator)	$39,620	$39,620	$0
Reach-In Freezer Solid Door	$39,000	$13,236	$25,765
Solar Attic Fan	$31,800	$31,800	$0
Room Occupancy Sensors	$24,720	$24,720	$0
Reach-In Freezer Glass Door	$18,011	$16,635	$1,376
Ladder Charge	$17,206	$17,206	$0
Package Units: VRF	$16,100	$8,050	$8,050
Fluorescent Delamping	$13,984	$13,984	$0
Fluorescent Delamping with Reflectors	$13,720	$13,720	$0
Ice Machine	$12,645	$3,709	$8,936
ECM Refrigeration	$12,120	$12,120	$0
CFL Specialty	$7,300	$7,300	$0
CFL	$6,052	$4,539	$1,513
Accounting-Sales Tax	$4,302	$4,302	$0
Rid-A-Fridge (Freezer)	$4,120	$4,120	$0

Table A14 (cont'd) Total vs. Incremental Measure Cost			
Measure	**Measure Total Cost ($)**	**Measure Incremental Cost ($)**	**Difference ($)**
Reach-In Refrigerator Glass Door	$2,576	$2,576	$0
Delamping	$936	$936	$0
Kitchen Aerators	$113	$113	$0
Bathroom Aerators	$59	$59	$0
Non-Qualifying Equipment	$0	$0	$0
Other	$0	$0	$0
Recycler App - Acct. Header Record	$0	$0	$0
Total	**$163,585,578**	**$133,796,214**	**$29,789,364**

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	**PY17 Budget (R6)**	**Percent Unspent**	**Unspent**	**Percent Unspent**
BEEM Operations	$970,539.67	$990,000.00	98.03%	$19,460.33	1.97%
BEEM Incentives	$4,095,059.67	$4,095,191.11	100.00%	$131.44	0.00%
Total BEEM	**$5,065,599.34**	**$5,085,191.11**	**99.61%**	**$19,591.77**	**0.39%**

CBEEM

Table B2 CBEEM Program Expenditures					
	Total Expenditures	**PY17 Budget (R6)**	**Percent Unspent**	**Unspent**	**Percent Unspent**
CBEEM Operations	$641,461.13	$680,000.00	94.33%	$38,538.87	5.67%
CBEEM Incentives	$4,026,757.89	$4,029,149.56	99.94%	$2,391.67	0.06%
Total CBEEM	**$4,668,219.02**	**$4,709,149.56**	**99.13%**	**$40,930.54**	**0.87%**

BESM

Table B3 BESM Program Expenditures					
	Total Expenditures	**PY17 Budget (R6)**	**Percent Unspent**	**Unspent**	**Percent Unspent**
BESM Operations	$44,911.03	$53,000.00	84.74%	$8,088.97	15.26%
BESM Incentives	$1,350.00	$3,500.00	38.57%	$2,150.00	61.43%
Total BESM	**$46,261.03**	**$56,500.00**	**81.88%**	**$10,238.97**	**18.12%**

BHTR

Table B4 BHTR Program Expenditures					
	Total Expenditures	**PY17 Budget (R6)**	**Percent Unspent**	**Unspent**	**Percent Unspent**
BHTR Operations	$450,705.92	$451,000.00	99.93%	$294.08	0.07%
BHTR Incentives	$3,105,711.83	$3,106,697.44	99.97%	$985.61	0.03%
Total BHTR	**$3,556,417.75**	**$3,557,697.44**	**99.96%**	**$1,279.69**	**0.04%**

APPENDIX C - RESIDENTIAL PROGRAM

Expenditures

REEM

Table C1 REEM Program Expenditures					
	Total Expenditures	**PY17 Budget (R6)**	**Percent Unspent**	**Unspent**	**Percent Unspent**
REEM Operations	$1,213,171.11	$1,215,000.00	99.85%	$1,828.89	0.15%
REEM Incentives	$6,555,398.78	$6,560,935.78	99.92%	$5,537.00	0.08%
Total REEM	**$7,768,569.89**	**$7,775,935.78**	**99.91%**	**$7,365.89**	**0.09%**

CREEM

Table C2 CREEM Program Expenditures					
	Total Expenditures	**PY17 Budget (R6)**	**Percent Unspent**	**Unspent**	**Percent Unspent**
CREEM Operations	$24,655.41	$25,000.00	98.62%	$344.59	1.38%
CREEM Incentives	$20,350.00	$28,000.00	72.68%	$7,650.00	27.32%
Total CREEM	**$45,005.41**	**$53,000.00**	**84.92%**	**$7,994.59**	**15.08%**

RESM

Table C3 RESM Program Expenditures					
	Total Expenditures	**PY17 Budget (R6)**	**Percent Unspent**	**Unspent**	**Percent Unspent**
RESM Operations	$34,618.14	$35,000.00	98.91%	$381.86	1.09%
RESM Incentives	$415,900.00	$416,912.5	99.76%	$1,012.50	0.24%
Total RESM	**$450,518.14**	**$451,912.5**	**99.69%**	**$1,394.36**	**15.08%**

RHTR

Table C4 RHTR Program Expenditures					
	Total Expenditures	**PY17 Budget (R6)**	**Percent Unspent**	**Unspent**	**Percent Unspent**
RHTR Operations	$259,526.22	$260,000.00	99.82%	$473.78	0.18%
RHTR Incentives	$881,160.51	$936,061.98	94.13%	$54,901.47	5.87%
Total RHTR	**$1,140,686.73**	**$1,196,061.98**	**95.37%**	**$55,375.25**	**4.63%**

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. The PY17 TRM was updated in close coordination with Program evaluators receiving final, signed approval by the PUC in August 2018. The PY17 TRM is available as a pdf in Attachment D, and also at the following link: https://hawaiienergy.com/files/about/information-and-reports/PY17_-_Hawaii_Energy_TRM.pdf.

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-riders[6]). 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		
O'ahu	**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% for estimates. The values used in PY17 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
BHTR	Multifamily Direct Install	1.00
REEM	Residential Energy Efficiency Measures	0.79
REEM	Peer Group Comparison	1.00
CREEM	Custom Residential Energy Efficiency Measures	0.73
RESM	Residential Services and Maintenance	0.92
RHTR	Residential Hard-to-Reach	1.00
Composite NTG Ratio		**0.78**

[6] 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**. Capacity reduction for Maui County was not applied. **Table D4** provides capacity values through year 2033, after which the Program assumes zero additional capacity avoided cost for the remaining years to provide the 20-year avoided cost list in **Table D3**.

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	Levelized
	273	812
	$/MWH	$/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	Levelized
	296	0
	$/MWH	$/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	Levelized
	257	1361
	$/MWH	$/kW-yr

Table D3
20 Year Utility Avoided Cost

			Discount Rate		
			6%	Utility Avoided Cost	
PY	Year	Measure Life	NPV Multiplier	$/kW/yr.	$/kWh/yr.
PY17	2017	1	1		$0.171
PY18	2018	2	0.94		$0.176
PY19	2019	3	0.89		$0.181
PY20	2020	4	0.84	$904	$0.187
PY21	2021	5	0.79	$986	$0.192
PY22	2022	6	0.75	$856	$0.198
PY23	2023	7	0.7	$750	$0.204
PY24	2024	8	0.67	$663	$0.210
PY25	2025	9	0.63	$590	$0.216
PY26	2026	10	0.59	$527	$0.223
PY27	2027	11	0.56	$474	$0.230
PY28	2028	12	0.53	$1,020	$0.236
PY29	2029	13	0.5	$1,066	$0.244
PY30	2030	14	0.47	$964	$0.251
PY31	2031	15	0.44	$875	$0.258
PY32	2032	16	0.42	$795	$0.266
PY33	2033	17	0.39	$724	$0.274
PY34	2034	18	0.37		$0.282
PY35	2035	19	0.35		$0.291
PY36	2036	20	0.33		$0.300

Table D5

PY13 System Level Demand Impacts - kW		
O‘ahu	16,481	76.4%
Hawaii	2,469	11.5%
Maui	2,597	12.0%
Molokai	8	0.0%
Lāna‘i	8	0.0%
Total	21,563	100.0%

APPENDIX E – ANNUAL REPORT TABLE CROSS-WALK (PY16 TO PY17)

PY17 Tables with corresponding PY16 References	
PY 17 List of Tables	**PY16 Table Reference**
Table 1	1
Table 2	2
Table 3	3
Table 4	4
Table 5	5
Table 6	6
Table 7	7
Table 8	8
Table 9	9
Table 10	10
Table 11	11
Table 12	12
Table 13	13
Table 14	14
Table 15	15
Table 16	16
Table 17	17
Table 18	18
Table 19	19
Table 20	20
Table 21	21
Table 22	22
Table 23	23
Table 24	24
Table 25	25

PY17 Tables with corresponding PY16 References	
PY 17 List of Tables	**PY16 Table Reference**
Table 26	26
Table 27	27
Table 28	28
Table 29	29
Table 30	30
Table 31	31
Table 32	32
Table 33	None
Table 34	33
Table 35	34
Table 36	35
Table 37	36
Table 38	37
Table 39	38
Table 40	39
Table 41	40
Figure XX	41
Table 42	42
Table 43	43
Table 44	44
Table 45	45
Table 46	None
Table 47	46
Table 48	47
Table 49	48

PY17 Tables with corresponding PY16 References	
PY 17 List of Tables	**PY16 Table Reference**
Table A1	Table A1
Table A2	Table A2
Table A3	Table A3
Table A4	Table A4
Table A5	Table A5
Table A6	Table A6
Table A7	Table A7
Table A8	Table A8
Table A9	Table A9
Table A10	Table A10
Table A11	Table A11
Table A12	Table A12
Table A13	Table A13
Table A14	Table A14
Table B1	Table B1
Table B2	Table B2
Table B3	Table B3
Table B4	Table B4

PY17 Tables with corresponding PY16 References	
PY 17 List of Tables	**PY16 Table Reference**
Table C1	Table C1
Table C2	Table C2
Table C3	Table C3
Table C4	Table C4
Table D1	Table D1
Table D2	Table D2
Table D3	Table D3
Table D4	Table D4
Table D5	Table D5

ATTACHMENTS

Attachment A: Acronym List

A list of the commonly used Hawai‘i Energy acronyms

Attachment B: PY17 Program Participation List

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

Attachment C: PY17 Annual Plan

The Program’s annual plan, which provides Leidos’ strategies and plans for administration and delivery of the Hawai‘i Energy portfolio for PY17 (July 1, 2017 to June 30, 2018).

Attachment D: PY17 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: PY17 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 F: Program, Customer and System Benefits Chart

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