Hawai'i Energy

PROGRAM YEAR

2018

ANNUAL REPORT

ANNUAL REPORT

Program Year 2018

July 1, 2018 – June 30, 2019

Submitted to the Hawai‘i Public Utilities Commission by:
Hawai‘i Energy (Leidos, Inc.)
Public Benefits Fee Administrator
1132 Bishop Street, Suite 1800
Honolulu, Hawai‘i 96813

A full report with attachments is available online at HawaiiEnergy.com/about/information-reports.

Hawai'i Energy's mission

is to empower island families and business to make smart energy choices that reduce energy consumption, save money, and pursue a 100% clean energy future.

TABLE OF CONTENTS

List of Tables 2
List of Figures 4
Executive Director's Message 5
Background 6
Program Year Overview & Organization 9
Performance Indicators and Results 16
Budget Progression & Expenditures 30
Portfolio Impacts 34
Business Program 47
Residential Program 65
Transformational Program 94
Rapid Response Energy Plan 119
Clean Energy Ally Program 123
Marketing & Communications 128
Appendix 135
Attachment List 161

LIST OF TABLES

Table 1 Levelized Cost of Saved Energy 13
Table 2 Customer Energy Cost Savings by Island 14
Table 3 Effective Average Utility Rates * 14
Table 4 Performance Indicators 17
Table 5 Estimation of Potential Fossil Fuel Avoidance 18
Table 6 Potential Green House Gas Equivalencies Avoided 19
Table 7 Example of the TRB Calculation using Look-Up Table 21
Table 8 Economically Disadvantaged Award Claim Calculation 22
Table 9 Contributions to PBF 22
Table 10 Energy Reduction Award Claim 25
Table 11 Demand Reduction Award Claim Summary 26
Table 12 Demand Reduction Award Claim Summary 27
Table 13 Economically Disadvantaged Award Claim Calculation 28
Table 14 Island Equity Award Claim Calculation 29
Table 15 PY18 Annual Plan Budget (in $) 30
Table 16 Budget Progression 7/1/18-6/30/19 32
Table 17 Program Expenditures and Unspent Funds 33
Table 18 Program-Level Impact Summary by Program 35
Table 19 Contribution by Equipment Category in Order of Lifetime Energy Impact 36
Table 20 Energy Impacts vs. Sales 41
Table 21 HECO Sales vs. Generated & Purchased 41
Table 22 Demand Impacts vs. Sales 41
Table 23 Measure Portfolio Total Resource Benefit and Costs (TRB & TRC) 43
Table 24 Island Equity by Business and Residential 44
Table 25 Island Equity Incentives by Rate Schedule 45
Table 26 Island Equity Energy Savings by Program Budget Category 45
Table 27 Island Equity Incentives by Program Budget Category 46
Table 28 Business Program Impacts Summary 47
Table 29 Business Program Expenditures 50
Table 30 Business Project Sources 51
Table 31 BEEM Program Impacts 53
Table 32 CBEEM - Program Impacts 56
Table 33 BESM Program Impacts 58
Table 34 BHTR Program Impacts 63
Table 35 Residential Program Impacts Summary 65
Table 36 Residential Program Expenditures 68
Table 37 Residential Project Sources 70

Table 38 REEM - Residential Energy Efficiency Measures Program Impacts 72
Table 39 REEM High Efficiency Water Heating Program Impacts 76
Table 40 Solar Water Heating System Installations by Island 76
Table 41 REEM High Efficiency Program Lighting Program Impacts 78
Table 42 REEM High Efficiency Air Conditioning Program Impacts 79
Table 43 REEM High Efficiency Appliances Program Impacts 81
Table 44 REEM Energy Awareness, Measurement and Control Systems Program Impacts 84
Table 45 CREEM Program Impacts 84
Table 46 RHTR Program Impacts 93
Table 47 Transformation Metrics 95
Table 48 Number of Rebates by Program Initiatives 121
Table 49 Hawai‘i Island Incentives 121

LIST OF FIGURES

Figure 1: Program Oversight and Support Organizations 7
Figure 2 Average Home Daily Demand (Load) Profile 20
Figure 3: Statewide Energy Efficiency Potential 38
Figure 4: EEPS Goal and Tracking 39
Figure 5: Example of TRB Value Calculation (Using Modified Current EEPS Utility Avoided Cost) 42
Figure 6: Select REEM Participation 74
Figure 7: PY18 Call Center Volume 74
Figure 8: PY18 Customer Satisfaction Ratings 75
Figure 9: Solar Water Heating Contractors 77
Figure 10: PY18 AC Tune-Up Participating Contractors 88
Figure 11: Hawaii County Rebate Participation (PY17 vs. PY18) 120
Figure 12: Hawaii County Energy Advantage Participation (PY17 vs. PY18) 122

EXECUTIVE DIRECTOR'S MESSAGE

Program Year 2018 (PY18) marks the end of Hawai'i Energy's first ever three-year program cycle and caps our strongest three-year period, delivering 460,000,000 kWh of energy savings and saving Hawai'i's families and businesses over $111,750,000. More impressive is the nearly $2 billion saved in energy costs since the inception of the Hawai'i Energy program, thanks to our community pursuing energy efficiency. As detailed in this Annual Report, covering July 1, 2018 through June 30, 2019, Hawai'i Energy delivered 124 million kWh in first-year savings and 1.65 billion kWh in lifetime energy savings. Energy efficiency continues to empower 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 1.25¢ 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, helping our state make strides toward achieving its additional goals of 100% Clean Transportation and 100% Carbon Neutrality by 2045.

As noted last year, with Hawai'i continuing to be a very expensive place to live, reducing monthly energy costs is important for our families and businesses. In July 2019, *CNBC* and *US News & World Report* cited the Council for Community and Economic Research's *2018 Annual Cost of Living Index* which ranked Hawai`i the most expensive state to live in America[1]. According to Aloha United Way's ALICE® (Asset Limited, Income Constrained, Employed) report released in late 2017, 165,013 Hawai'i 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. In PY18, we continued our focus in this area and are excited to share that the savings realized through participation in the Hawai'i Energy programs will yield approximately $537 million over the life of installed measures.

With over more than 80% of the businesses in Hawai'i being small businesses, Hawai'i Energy has increased its focus to connect them with energy efficiency benefits. Hawai'i Energy helped over 7650 underserved small businesses with our direct install lighting program. This will result in the customers saving over 118,183 MWh over the life of the lighting system that will generate over $33.7 million in lifetime cost savings for these companies.

Hawai'i Energy started a number of new programs in PY18. Recognizing that nonprofit organizations play a vital role in addressing needs across many communities but often struggle under high utility and other operating costs that affect their ability to provide high-quality services, Hawai'i Energy rolled out the EmPOWER Hawai'i Project (EmPOWER). EmPOWER focused on addressing specific barriers to participation in energy efficiency projects and provided elevated incentives to reduce upfront costs. Additionally, the program provided training sessions throughout the year to engage with employees, increase their energy literacy and assist with energy efficiency project development and execution. Participants were also provided with direct connections to the Hawai'i Energy Clean Energy Ally trusted network. Our first EmPOWER cohort had 5 participants, 3 of which completed their projects by the end of PY18, achieving first-year savings of 120,720 kWh.

Hawai'i Energy also launched the Rapid Response Program to help offset the loss of renewable generation caused by the closure of the Puna Geothermal Venture power plant on Hawai'i Island as a result of the eruption of Kīlauea Volcano. Significantly enhanced rebates were applied across both commercial and residential projects to encourage quick adoption of energy efficiency measures. New measures were added, such as air purifiers and air conditioners, as many residents were purchasing these items to deal with the poor air quality from the eruption. One of the highlights of the initiative was the significant increase in small business participation through the Energy Advantage program. In total, 196 small business projects were completed, saving nearly 1.8 million kWh and providing over $600,000 in incentives. This was a 73% increase in projects and an 87% increase in incentives over PY17 on Hawai'i Island.

As we celebrate our 10th year serving Hawai'i's families and businesses, I want to thank all of your for your commitment to make smart energy choices which save energy, save money, and accelerate our path to a 100% clean energy future. Mahalo!

Respectfully submitted,
Brian Kealoha

---

[1] *Cost of Living Index, The Council for Community and Economic Research, www.coli.org, 2018.*

BACKGROUND

Program Origins

In 2006, the Hawaiʻi Legislature (see Hawaiʻi Revised Statutes §269-121 through 269-124) authorized the Public Utilities Commission (PUC) to transfer the existing demand-side management (DSM) surcharge collected by Hawaiʻi'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 Hawaiʻi'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.

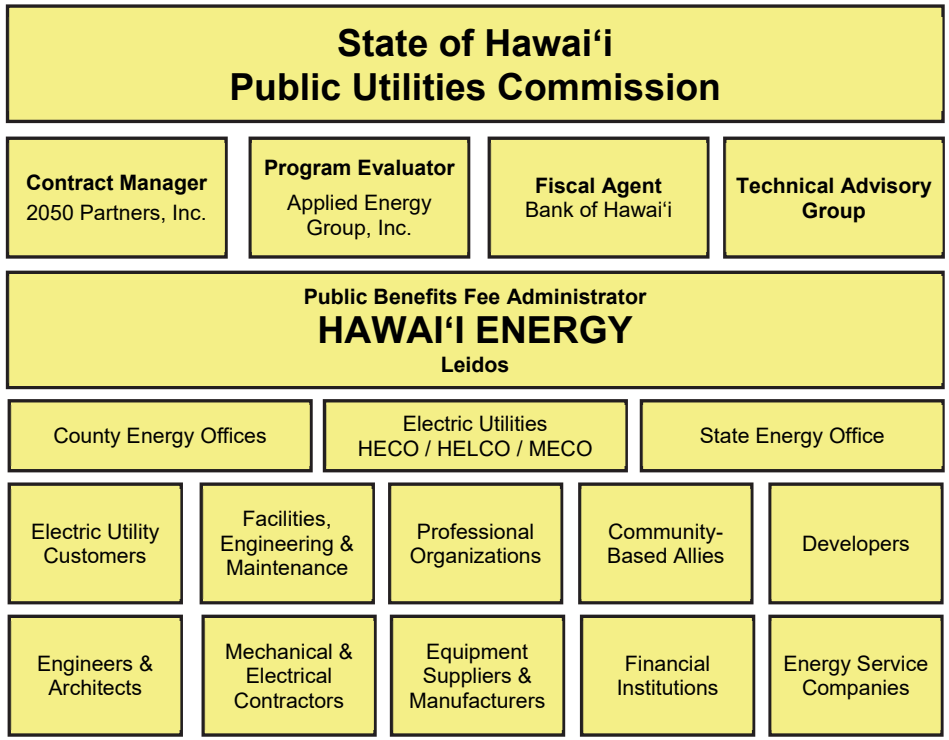
On September 18, 2008, the PUC issued a competitive Request for Proposal (RFP) soliciting proposals and pricing for a Program Administrator for the Hawaiʻi Energy Efficiency Program. Science Applications International Corporation (SAIC) [now Leidos Engineering, LLC (Leidos)] submitted a proposal and 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 Hawaiʻi's first PBFA and would operate the Hawaiʻi 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 Hawaiʻi 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 Hawaiʻi 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, a minimum of 70% of the contract value was designated for direct incentives in the form of direct cash incentives or services. This Annual Report marks the end of the current three-year contract period.

Oversight and Support

During PY18, 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 complete the Hawai'i Energy team. These key subcontractors include:

- **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.
- **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.
- **Vermont Energy Investment Corporation** – Provided support for Business and Residential Program design, codes training, and Continuous Energy Improvement (CEI) efforts.
- **Tendril** – Provided peer group comparison Home Energy Reports to residences in Maui County, Hawai'i County and select parts of City &County of Honolulu
- **ENGIE Services U.S.** – Provided educator training through the accredited Hawai'i Department of Education (DOE) "Professional Development: Educate, Empower, Excel" (PDE3) 3-credit courses titled, *Teaching Energy with Science, Technology, Engineering, Art, and Mathematics (STEAM)*, that engaged K-12 teachers in energy efficiency curriculum.
- **Kevala+** – Provided development services for a geographic information systems (GIS)-based energy efficiency and communication tool for locational analysis.
- **Pacific Rim Concepts, LLC** – Provided event planning and logistical support for the Program's inaugural Innovation Symposium.
- **Vivian Ward Affairs** – Provided "*Energy Unplugged*" workshops to assist communities and organizations in the areas of financial literacy and energy efficiency.
- **Helen N. Wai, LLC** – Provided "*Sharing the Aloha*" workshops to assist communities and organizations in the areas of financial literacy and energy efficiency.
- **Wall-to-Wall Studios** – Provided branding, program collateral materials design, and market research 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.

PROGRAM YEAR OVERVIEW

Hawaiʻi Energy closed out its three-year program cycle having grown our impact with customers and Clean Energy Allies. Efforts to enhance programs, drive deeper energy savings with customers and expand market transformation work continued, and, together with our community, Hawaiʻi Energy helped reduce energy consumption by 147,000 Megawatt hours. This equates to over $39 million in first year energy savings and over $538 million over the life of the measures installed in PY18.

Most notably, as a result of the 2018 eruption of Kīlauea Volcano, Hawaiʻi Energy responded to a request from Governor Ige to support Hawaiʻi island by launching the Rapid Response Program at the start of the program year. Through this effort, significantly elevated rebates were designated for specific equipment that were determined to have the greatest impact in reducing energy use for Hawaiʻi island residents and businesses. The comprehensive effort included customer website resources, a communications initiative to alert customers through Big Island media outlets, and in-person outreach for local contractors and retailers. The overall stimulus produced a 121% increase in Hawaiʻi island rebates (3,311 versus 1,501 in PY17), a significant portion of which included hard-to-reach businesses and residents.

Hawaiʻi Energy continues to actively engage 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 our second Stakeholder Meeting that proved foundational in shaping this dialogue and informing the development of the PY19-21 Triennial Plan. Held on November 9, 2018, the meeting was attended by 50 attendees representing state and county governments, public and private education customers, the Hawaiian Electric companies, hotels, business contractors, and nonprofits in efficiency, sustainability and economic development.

This spring, Hawaiʻi Energy also hosted its second Innovation Symposium on April 17 at the Sheraton Waikīkī. This year's event was headlined by Maria Vargas, Director of the U.S. Department of Energy's Better Buildings Challenge. With more than 200 facilities management professionals, energy industry representatives, and Clean Energy Ally exhibitors, this is our largest outward-facing event, providing the opportunity for facility managers to receive valuable training and contractors gain exposure to potential projects. The Program secured more than $35,000 in corporate sponsorships to help offset administrative costs, something we look to increase in the future as a way to stretch ratepayer funding further. Additionally, Hawaiʻi Energy and sponsor partners provided scholarships for students from Oʻahu and Hawaiʻi Island to attend the Symposium and engage with business professionals, including a special "meet and greet" session for students and their sponsors.

Business Program Highlights

- First-year savings: 78,927,099 kWh
- Lifetime savings: 1,199,361,878kWh
- Demand savings: 10,946 kW
- Incentives provided: $11,292,693

In relative terms, 60.5% of Hawaiʻi Energy's incentives (out of $18,667,244 of direct incentives) captured 63.9% of first-year kWh, 72.6% of lifetime kWh and 53.5% of kW demand first-year savings, respectively, with a Total Resource Benefit-to-Cost ratio of 2.9. These achievements are the result of a multi-pronged approach in day-to-day operations based upon a channel, sector, and end-use technology paradigm. The PY18 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 effective and productive collaboration with customers, manufacturers, distributors, facility management firms, consultants and contractors.

While the *Lighting Distributor Instant Rebate Program* (midstream) has stabilized in growth, it continues to be one of Hawaiʻi Energy's most successful and cost-effective programs. In this offer, incentives are given to local and national lighting distributors on prescriptive lighting measures, enabling them to offer customers discounts at the point of purchase. By the end of PY18, the Program had 24 active participating lighting distributors, who advanced $709,016 in Hawaiʻi Energy incentives for energy efficient lighting products that generated 11,324,592 kWh in program-level energy savings and 823 kW in program-level demand savings.

Hawaiʻi Energy continues to solicit feedback from industry partners to update program design. This year we worked with a high-performing booster pump Clean Energy Ally to design a limited-time bonus of $2,000 that was applied to each booster pump project. The overall result was a 33% increase in projects when compared to PY17.

The Energy Advantage program continued to be an important element of the overall business portfolio, and specifically, of hard-to-reach efforts. In PY18, 760 small businesses and restaurants participated, with 196 of the projects taking place on Hawaiʻi Island as part of Rapid Response. In total, Energy Advantage efforts will result in customers saving 118,183,264 kWh over the life of the lighting system, and Hawaiʻi Energy provided $2,458,059 toward offsetting these project costs, an investment that will generate over $33.7 million in lifetime cost-savings for these businesses.

New for PY18, Hawaiʻi Energy rolled out the EmPOWER Hawaiʻi Project (EmPOWER), which focused on addressing particular barriers nonprofits face when energy efficiency projects, include a lack of capital, lack of on-site knowledge and expertise on energy, and unfamiliarity with contractor sourcing.
We recognize that nonprofits play a vital role in addressing community needs across many market sectors and EmPOWER was developed to provide elevated incentives to reduce upfront costs of energy efficiency projects, free training sessions throughout the year, and provide direct connections to the Clean Energy Ally network.

A total of five nonprofit organizations were chosen to participate in the inaugural cohort. Recruitment efforts included promoting the program through our digital channels, as well as reaching out to organizations like Aloha United Way and the Hawaiʻi Association of Nonprofit Organizations (HANO) to inform their networks. Hawaiʻi Energy paid special attention to nurturing the relationship with cohort participants, encouraging them to pursue further projects and providing added-value marketing opportunities for them to share about their work. By the end of PY18, three retrofits were completed and the Program awarded a total of $36,313 and achieved first-year savings of 120,720 kWh and demand savings of 12 kW. Due to varying completion dates, some rebates were paid out of and attributed to the PY18 budget, while those that did not complete their projects continued into PY19.

Residential Program Highlights

- First-year savings: 78,927,099 kWh
- Lifetime savings: 1,199,361,878kWh
- Demand savings: 10,946 kW
- Incentives provided: $11,292,693

In relative terms, the Residential programs accounted for 36% of Hawaiʻi Energy's total first-year energy savings and 47% of the Program's total demand savings with 40% of the Program's incentives. The strategies for implementing Hawaiʻi Energy's Residential programs in PY18 were also multi-pronged and

included enhanced offerings for trade allies, updated behavioral programs, flexibility in incentive delivery mechanisms, and growth in both retail and community partners.

Hawaiʻi Energy's continues to diversify away from lighting as a means to keep up with market pricing trends and mitigate free-ridership. The Program lowered the average incentive per LED bulb to an average of $1.54, a decrease of over 28% as compared to PY17. A significant amount of effort continued to be expended in PY18 to vigilantly monitor market conditions as LED lighting technologies and prices rapidly evolved, and will continue into the next triennial period. From a savings perspective, a tiered reduction in the program attribution (Net-to-Gross (NTG) ratio) was applied for upstream lighting in PY18, reflecting a drop in residential lighting NTG ratio to an average of 0.575, down from 0.79 in PY17. Accordingly, PY18 total kWh from lighting was over 51% less than PY17's total first-year kWh.

Air conditioning programs were further enhanced by incorporating ongoing trade ally input. The AC Tune-Up rebate was increased to $100 from $75 to incentivize maintenance, and this offer doubled in participation over PY17. The central AC program also realized almost 40 rebated units, a result of our Allies working with their customer base to take advantage of these savings. Additionally, as a complement to the existing mail-in rebates, a new approach was initiated in PY18 to incentivize the purchase, installation and recycling of energy-efficient window air-conditioners. Affordable Home AC (AHAC), a new addition to the Clean Energy Ally program, customized an approach to work with local families to remove old window ACs and replace them with high-efficiency window ACs, then teamed up with local business Refrigerant Recycling to recycle the old window AC units, creating a "one-stop shop" for window AC replacements.

By offering midstream incentives to retailers for appliances and electronic products, Hawaiʻi Energy influences retailer displays and upstream purchase decisions by significantly improving profits and margins on these products. In Hawaiʻi, where supply chain considerations can have a significant impact on product availability, this model has the potential to improve the overall selection of ENERGY STAR® products on retail floors. Notably, the heat pump midstream program (launched through Lowe's in PY17) resulted 228 heat pumps sold in PY18 versus 81 in PY17 – a substantial increase.

The Home Energy Report (HER) program was refreshed and revamped with a different analytical approach, and a new customer look emphasizing positive feedback by grouping and comparing homes rather than neighbors across Hawaiʻi, Honolulu, and Maui Counties. The program distributed personalized HERs to all eligible customers to provide insight into their electricity consumption and how it compares to that of similar homes. This encourages customers to take charge of their energy usage and save money on electric bills.

Energy Smart 4 Homes (ES4H) continues to provide hard-to-reach residential single-family and multi-family customers with direct access to turnkey energy efficiency solutions, such as high-efficiency lighting and water measures and energy management devices. In PY18, although the access to large multi-family complexes decreased on Oʻahu, the program deployed more resources in Maui and Hawaiʻi Counties and increased its service to single-family residences at targeted communities, resulting in servicing 3,840 customers.

Transformational Program Highlights

Market Transformation programs surpassed all targets for participant engagement again this year.

Behavior Modification

Over 100 hard-to-reach workshops were conducted this year, 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 across the islands. Blue Planet

Foundation also provided workshops to communities throughout the state, including employees of large businesses, hotels, residents with limited knowledge of Hawaiʻi Energy programs or energy efficiency, residents with limited access to efficiency improvements or lacking the ability to make energy efficiency changes (e.g., low-income customers, those who speak English as a second language, renters, geographically-isolated residents).

Additionally, Hawaiʻi Energy continued a strong investment in youth audiences, equipping students and youth-based organizations with the knowledge and tools to solve future energy issues. Workshops and events delivered by Blue Planet Foundation touched on a variety of energy efficiency topics and included multimedia content, hands-on activities, special events and gamified challenges to help spur creativity and develop higher-level critical-thinking skills. Enhanced engagement activities reached over 10,000 participants, with the Program record 4,289 participant hours.

Professional Development and Technical Training
The Program achieved 10,156 participant hours by hosting technical seminars and workshops, professional certification courses, internships and advanced sales trainings. Notable events included K-12 educator training through the Department of Educationʻs PDE3 courses ("Professional Development: Educate, Empower, Excel"; a Chamber of Commerce Hawaiʻi panel on energy and climate change; a new Sustainability Leadership course with the Sustainable Living Institute of Maui (SLIM) at UH Maui College; a workshop for local real estate professionals on "green real estate"; and an Association of Energy Engineers (AEE) training called "The Importance of Maintenance on Energy Efficiency Project Equipment."

Energy in Decision Making
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. Hawaiʻi Energy initiated a Community-Based Energy Efficiency (CBEE) program with Pūlama Lānaʻi as a holistic approach in addressing the needs of communities and recognizing the equity obligation to provide access to energy efficiency resources to all islands and demographic groups. The initial engagement resulted in the near-term implementation of Residential energy efficiency services followed by Business offerings in the next program year.

Continuous Energy Improvement (CEI) efforts expanded in PY18 through continued collaboration with Hawaiʻi Green Growth's Sustainable Business Forum, a collective of businesses that meet at the executive level to advance Hawaiʻi's sustainability goals. 14 members of the forum completed the CEI curriculum in pursuit of quantifying measurable progress towards Hawaiʻi Green Growth's Aloha+ Challenge, recognizing that energy efficiency was a critical piece of the Challenge's six focus areas.

Codes and Standards
The Program supported numerous energy related bills in the 2018 state legislative session by submitting written testimony and attending hearings in person. Priority measures included State Appliance Efficiency Standards (HB556, SB1323), Solar Water Heater Variance Amendments (HB557, SB617) and Benchmarking for Commercial Buildings (HB1520). The major achievement of this legislative session was the successful adoption of HB556, introduced and championed by Hawai`i State Representative Nicole Lowen of District 6 (Kailua-Kona, Holulaloa, Kalaoa, Honokohau). The bill was finalized and signed into law after much collaborative effort between key entities, such as the Public Utilities Commission, the Department of Commerce and Consumer Affairs, Hawaiʻi Energy and the State Energy Office. Blue Planet Foundation also played an important role helping bring these parties to arrive at compromise language while balancing concerns of each stakeholder.

Clean Energy Collaboration

Hawai'i Energy continued to build on the successful Collaboration Framework established with the Hawaiian Electric Companies to help increase the effectiveness of both parties' Demand-Side Management (DSM) efforts through shared learnings, alignment on common endeavors, and identification of new partnership opportunities. Notable accomplishments in PY18 included an Integrated Demand Side Management (IDSM) pilot with Hawaiian Electric and Shifted Energy and an Electric Vehicle Charging Station rebate program in collaboration with Ulupono Initiative.

Program Achievements

- The Program invested a total of $28,008,357 (**Table 17**) to deliver 2,237,809,622 kWh (System-level, **Table A1**) over the measure lives resulting in a cost per kWh of $0.01. The Total Program Levelized Cost of Saved Energy (CSE) in PY18 was $0.0219/kWh, as calculated in **Table 1** below.
- Delivered $18,667,919 in incentives (**Table 17**) driving customer bill savings of $39,371,180 annually and $537,647,754 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 123,583,370 kWh (**Table 18**).

Table 1
Levelized Cost of Saved Energy

			w/o Transformation	Total Program
Discount Rate	A		6%	6%
Estimated Program Savings Life	B		13.4	13.4
Total Program Budget Less Direct Install Programs	C*		$ 26,773,053	$ 28,998,417
Annual kWh Saved at Customer Level	D		146,568,596	146,568,596
			0	0
A*(1+A)^B			0.131	0.131
(1+A)^B-1		÷	1.183	1.183
Capital Recovery Factor			0.111	0.111
			0	0
	C		$ 26,773,053	$ 28,998,417
Capital Recovery Factor	x		0.111	0.111
	D	÷	146,568,596	146,568,596
Levelized CSE			**$ 0.0202**	**$ 0.0219**

Transformational Costs	***Cost****
Total Program PY18 Expenditures	$ 28,998,417
RTRAN Incentives	$ 1,069,081
BTRAN Incentives	$ 1,156,283
	$ 26,773,053

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

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

Table 2 **Customer Energy Cost Savings by Island**									
Customer First-Year Energy Cost Savings									
Island	**R**	**G**	**J**	**P**	**DS**	**F**	**Other**	**Total**	**kWh - 1st yr**
Oahu	$10,992,256	$822,203	$6,090,648	$5,075,602	$2,143,811	$2,190,315	$0	$27,314,833	107,718,394
Hawaii Island	$3,139,930	$608,350	$1,947,513	$825,180	$0	$0	$0	$6,520,972	20,580,498
Maui	$2,322,829	$293,855	$1,612,107	$1,055,258	$0	$0	$0	$5,284,049	17,603,222
Lanai	$129,310	$964	$2,592	$0	$0	$0	$0	$132,866	349,232
Molokai	$99,557	$8,495	$10,407	$0	$0	$0	$0	$118,459	317,249
Total	**$16,683,882**	**$1,733,867**	**$9,663,266**	**$6,956,039**	**$2,143,811**	**$2,190,315**	**$0**	**$39,371,180**	**146,568,596**
Customer Lifetime Energy Cost Savings									
Island	**R**	**G**	**J**	**P**	**DS**	**F**	**Other**	**Total**	**kWh - Lifetime**
Oahu	$122,903,838	$11,408,494	$87,777,094	$72,953,149	$32,877,027	$47,226,450	$0	$375,146,051	1,492,519,360
Hawaii Island	$36,358,996	$8,624,959	$28,598,000	$12,990,437	$0	$0	$0	$86,572,391	275,685,054
Maui	$27,749,700	$4,235,224	$24,853,198	$16,565,308	$0	$0	$0	$73,403,430	246,180,418
Lanai	$1,032,071	$11,486	$38,539	$0	$0	$0	$0	$1,082,096	2,842,315
Molokai	$1,200,742	$101,988	$141,057	$0	$0	$0	$0	$1,443,786	3,868,446
Total	**$189,245,347**	**$24,382,150**	**$141,407,887**	**$102,508,894**	**$32,877,027**	**$47,226,450**	**$0**	**$537,647,754**	**2,021,095,594**

Table 3 **Effective Average Utility Rates *** **($/kWh)**							
Island	**R**	**G**	**J**	**P**	**DS**	**F**	**Other**
Oahu	$0.29495	$0.28574	$0.23865	$0.21147	$0.20200	$0.29452	$0.25455
Hawaii Island	$0.33592	$0.37608	$0.30038	$0.26345	$0.00000	$0.38389	$0.33194
Maui	$0.31687	$0.33830	$0.29508	$0.26778	$0.00000	$0.32201	$0.30801
Lanai	$0.38004	$0.41301	$0.38990	$0.36481	$0.00000	$0.40554	$0.39066
Molokai	$0.37008	$0.44048	$0.35949	$0.28329	$0.00000	$0.39106	$0.36888

* Average per kWh customer electric cost based on average utility energy costs by rate & island for PY18

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 PY19-21 Triennial plan and integrating 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. 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. More information is needed by Hawaiʻi Energy around temporal and locational values to best support the utility's efforts.

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

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 PY18 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. Multi-Family 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 PY18 Annual Plan Performance Goals & Incentive Table by providing the claimed actual results. The Milestone is the minimum achievement for the performance award, calculated as 75% of the overall Target. The Target represents 100% achievement. Percent of Target and calculated Award Claim are also provided for a comprehensive view of the goals, metrics and Program performance for PY18.

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, Market Transformation, and Customer Satisfaction.

Indicators for Resource Acquisition and Economically Disadvantaged Impacts are milestone-based, with milestone targets at 75% of the annual (or cumulative) goals and at the remaining 25% of the target amount (or portion thereof). Island Equity, Market Transformation, and Customer Satisfaction Indicators must meet 100% of the annual target goal and are not cumulative (i.e., total awards not met are forfeited). A total of $1,001,669.00 in performance amounts were allotted for PY18.

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

Table 4 **Performance Indicators**

RESOURCE ACQUISITION	Milestone	Target	Results	Metrics	Fraction of Award	Award Milestone	Target Award	Actual	Actual Claim
Energy Efficiency & Conservation	**75%**	**100%**							
First Year Energy Reduction	95,672,810	127,563,746	123,583,370	kWh	**15%**	**$112,687.76**	**$150,250.35**	**96.90%**	**$145,562.08**
Peak Demand Reduction	15,908	21,211	20,473	kW	**15%**	**$112,687.76**	**$150,250.35**	**96.50%**	**$145,022.65**
Total Resource Benefit	$243,134,457	$334,761,873	$333,347,497	$	**40%**	**$300,500.70**	**$400,667.60**	**99.60%**	**$398,974.77**
			Resource Acquisition Performance Award:		**70%**	**$525,876.23**	**$701,168.30**	**98%**	**$689,559.50**
CUSTOMER EQUITY	**Milestone**	**Target**	**Results**	**Metrics**	**Fraction of Award**	**Award Milestone**	**Target Award**	**Actual**	**Actual Claim**
Economically Disadvantaged	**75%**	**100%**							
Energy Advantage	506	675	760	Customers served	**7%**	**$52,587.62**	**$70,116.83**	**100%**	**$70,116.83**
	5,625,000	7,500,000	8,441,662	kWh					
Multifamily Direct Install	2,769	3,692	3,840	Customers served					
	1,018,387	1,357,849	1,833,699	kWh					
Island Equity									
County of Hawaii	NA	13%	17.70%	Amount spent in each county	**10%**	**NA**	**$100,167**	**100%**	**$100,166.90**
County of Maui	NA	13%	13.70%					**100%**	
City & County of Honolulu	NA	74%	68.60%					**100%**	
			Customer Equity Performance Award:		**17%**	**$52,587.62**	**$170,283.73**	**100%**	**$170,283.73**
MARKET TRANSFORMATION	**Milestone**	**Target**	**Results**	**Metrics**	**Fraction of Award**	**Award Milestone**	**Target Award**	**Actual**	**Actual Claim**
Behavior Modification	**NA**	**100%**							
Community Workshops (Hard-to-reach, Energy Literacy)	NA	2,500	2,865	Participant hours	**3.90%**	**NA**	**$39,065**	**100%**	**$39,065.09**
Youth Education Workshops and Presentations	NA	1,000	1,423.50	Participant hours					
Youth Event Sponsorships	NA	2	3	Events					
Enhanced Engagement (Gamification)	NA	1,000	10,033	Participants					
Transformational Videos	NA	10	10	Videos					
Professional Development & Technical Training		**100%**		Participant hours	**3.90%**	**NA**	**$39,065**	**100%**	**$39,065.09**
Clean Energy Ally Support	NA	8,370	327.25						
Targeted Ally Training Opportunities	NA		101						
Targeted Participant Training Opportunities	NA		8,743.41						
Educator Training and Grants.	NA		723						
Energy Industry Workforce Development	NA		567.5						
Energy in Decision Making		**100%**			**1%**	**NA**	**$10,016.69**	**100%**	**$10,016.69**
Continuous Energy Improvement (CEI)	NA	2	15	Cohort participants					
Community Based Energy Efficiency	NA	1	1	Cohort participants					
Codes and Standards		**100%**			**1%**	**NA**	**$10,016.69**	**100%**	**$10,016.69**
Codes Identification and Adoption	NA	9	14	Advocacy Events					
Code-Related Training & Compliance	NA	70	141	Participant hours					
Leading Edge Technologies and Strategies	NA	1-Apr	1-Apr	Stakeholder Mtgs / Report					
Standards Enhancement	NA	3	7	Engagements					
Clean Energy Collaboration					**0.20%**	**NA**	**$2,003**	**100%**	**$2,003.34**
iDSM pilot project	NA	1	1	Pilot Projects					
			Market Transformation Performance Award:		**10%**	**NA**	**$100,166.90**	**100%**	**$100,166.90**
CUSTOMER SATISFACTION	**Milestone**	**Target**	**Results**	**Metrics**	**Fraction of Award**	**Award Milestone**	**Target Award**	**Actual**	**Actual Claim**
Customer Satisfaction	**NA**	**100%**							
Application Processing Customer Experience	NA	> 8.5	9.05	Overall satisfaction score	**3%**	**NA**	**$30,050.07**	**100%**	**$30,050.07**
			Customer Satisfaction Performance Award:		**3%**	**NA**	**$30,050.07**	**100%**	**$30,050.07**
			Maximum Performance Award:		100%	NA	$1,001,669.00		$1,001,669.00
			TOTAL PERFORMANCE AWARD:		**98.84%**				**$990,060.20**

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

Target: 127,563,746 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 123,583,370 kWh currently equates to 1,307,512 MMBTUs or avoided use of 214,198 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 in PY18				
Annual Program Level Energy Savings Achievement		123,583,370	kWh/Yr.	
Average Program Attribution to System Level Impact	÷	76.16%		
System Level Gross Generation Energy Impact		**162,272,648**	kWh/Yr.	
Electrical Generation Source Distribution				
Renewable Energy Generated*		2,324,217	kWh/Yr.	
Less avg. 4.4% T&D Losses^	x	95.6%		
Est. of Renewable Energy Sold		2,221,951	kWh/Yr.	25.6%
Est. Fossil-Fueled Energy Sold	+	6,466,821	kWh/Yr.	74.4%
Total Energy Sold (2018 RPS Report)		8,688,772	kWh/Yr.	
Customer-Sited, Grid-Connected Renewable DG*		948,474	kWh/Yr.	10.9%
System Level Gross Generation Energy Impact		162,272,648	kWh/Yr.	
% System Average Fossil-Fuel Generation	x	74.43%		
Reduction Target Impact in Fossil Fuel-Generation		120,775,190	kWh	
Energy Avoided into Generators				
Fossil-Fuel Energy Generated		120,775,190.43	kWh	
Avg. System Generating Heat Rate^	x	10,826.00	BTU/kWh	
Energy Required for Fossil-Fueled Electricity Production		1,307,512,211,594	BTU/Yr.	
Generation Liquid Fossil Fuel Mix				**% 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	18.0%
Energy in BBL of Naphtha (**4%^**)		5,335,500	BTU/BBL	4.0%
Average System BTU/BBL		6,104,220	BTU/BBL	100.0%
Energy Required for Fossil-Fueled Electricity Production		1,307,512,211,594	BTU/Yr.	
Average System BTU/BBL	÷	6,104,220	BTU/BBL	
Number of Barrels of Fossil-Fuel Avoided		214,198	BBLs/Yr.	
Number of Barrels of Fossil-Fuel Avoided		214,198.08	BBLs/Yr.	
Estimated Cost per BBL for Fossil Fuels	x	$ 87.74	per BBL	
Potential Fossil Fuel Cost Savings to State		$ 18,793,740	per year	

*From 2018 RPS Report ^From HEI 10K Report, 2018

Environmental Benefits

Reducing energy consumption has significant environmental benefits. In the past year, the energy-saving efforts of all participants have resulted in lowering Hawai'i's environmental footprint as demonstrated in **Table 6.**

The reduction of emissions was equivalent to removing over 24,000 passenger vehicles from the roads. The fossil fuel reduction was the equivalent of the generating output of over 377,000 PV solar panels.

Table 6 **Potential Green House Gas Equivalencies Avoided**		
System Level Gross Generation Energy Impact	162,272,648	kWh/Yr.
Green House Gas Reduction[2]		
Energy in kWh	162,272,648	kWh/Yr.
Energy in MWh	162,273	MWh/Yr.
CO_2 - Carbon Dioxide	134,921	Tons per Year
CH_4 - Methane	15	Tons per Year
N_2O - Nitrous Oxide	2	Tons per Year
Green House Gas Equivalencies[3]		
Less Passenger Vehicles	24,363	
Less miles/year driven (avg passenger vehicle)	280,565,441	
Wind turbines installed	24	
Acres of US forest CO_2 sequestered in one year	135,053	
Fossil Fuel Reduction Comparison to PV and SWH		
Rooftop PV Panels (300W) to offset same energy usage	377,661	
Solar Water Heating Systems to offset same energy usage	70,987	

[2] *Power Profiler - HICC - O'ahu - Excel tool and Website http://oaspub.epa.gov/powpro/ept_pack.charts*

[3] *EPA's Greenhouse Gas Equivalencies Calculator https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator*

Performance Indicator #2: Peak Demand Savings

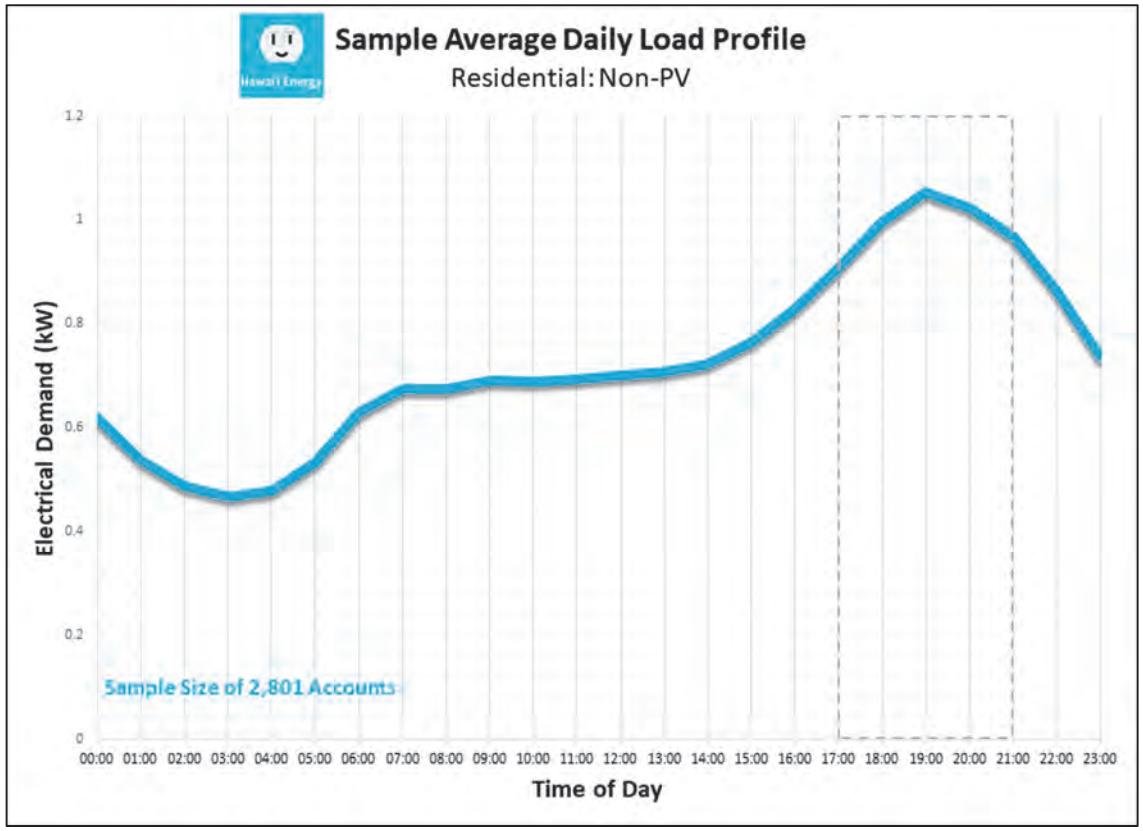
Target: 21,211 kW

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 (**Figure 2)**. System demand (load) is typically highest when hot and 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.

Those who install energy efficient equipment and participate in the Hawai‘i Energy program by receiving an incentive benefit from lower electrical costs resulting from their actions, and all customers benefit from the avoided cost to provide additional units of generation to meet increasing electrical peak demand. The PY18 peak demand reduction target was 21,211 kW. The Program achieved 97% of this target, reducing peak demand by 20,473 kW. This is equivalent to the average peak power consumption of 20,473 homes at 1 kW each. An average load profile from 15-min. interval meter data for O‘ahu residences in PY18 illustrates the 5:00-9:00 p.m. peak average of 1 kW in **Figure 2**.

Two challenges drive the Program’s ability to plan for (i.e., predict) kW performance. The first challenge is the measure mix of prescriptive measures and the second is the degree to which custom projects have unique operating hours and utility peak coincident factors. Given that 63% of Business program incentives and 48% of Commercial program demand reduction are based on projects (typically CBEEM and Energy Advantage projects) that employ project-unique operating hours, there are limitations to how well 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 evaluate load profile information as published reports and project data monitoring provide.

Figure 2: Average Home Daily Demand (Load) Profile



Performance Indicator #3: Total Resource Benefit (TRB)

Target: $334,761,873

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 of a hypothetical project consisting 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 performed for each measure and 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**
2018	1	1	$0	$0.176	$0	$0.1760	$0	$0.1760	$0	$4,400	$4,400	0.10
2019	2	$0.94	$0	$0.181	$0	$0.1710	$0	$0.3470	$0	$8,675	$8,675	0.19
2020	3	$0.89	$904	$0.187	$805	$0.1660	$805	$0.5130	$20,125	$12,825	$32,950	0.73
2021	4	$0.84	$986	$0.192	$828	$0.1610	$1,633.00	$0.6740	$40,825	$16,850	$57,675	1.28
2022	5	$0.79	$856	$0.198	$678.00	$0.1570	$2,311.00	$0.8310	$57,775	$20,775	$78,550	1.75
2023	6	$0.75	$750	$0.204	$560.00	$0.1520	$2,871.00	$0.9830	$71,775	$24,575	$96,350	2.14
2024	7	$0.70	$663	$0.210	$467.00	$0.1480	$3,338.00	$1.1310	$83,450	$28,275	$111,725	2.48
2025	8	$0.67	$590	$0.216	$392.00	$0.1440	$3,730.00	$1.2750	$93,250	$31,875	$125,125	2.78
2026	9	$0.63	$527	$0.223	$331.00	$0.1400	$4,061.00	$1.4150	$101,525	$35,375	$136,900	3.04

Performance Indicator #4: Economically Disadvantaged

Target: See Table 8

The Economically Disadvantaged performance indicator is intended to increase implementation of energy-reducing measures with Program-defined hard-to-reach business and residential sectors. These include small businesses and restaurants through the Energy Advantage offering, low-income multi-family building common area lighting upgrades, and packaged low-income, multi-family in-unit upgrades which include certain lighting types, water flow reducers, and smart power strips.

Table 8
Economically Disadvantaged Award Claim Calculation

Target Metrics	Milestone	Target
Energy Advantage - (kWh)	5,625,000	7,500,000
Energy Advantage - (Customers Served)	506	675
Multi-Family Direct Install - (kWh)	1,018,387	1,357,849
Multi-Family Direct Install - (Customers Served)	2,769	3,692

Performance Indicator #5: Island Equity (Broad Participation)

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

The Island Equity target is intended to promote the equitable participation in the Program among the counties. For PY18, "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 **9** lists the results of the PY18 contributions to the PBF by island and county.

Table 9
Contributions to PBF

Island	Residential Program Investment	Business Program Investment	PBFA Investment	%
Hawai'i Island	$1,336,878	$1,809,052	$3,145,931	13.4%
Lāna'i	$45,705	$35,658	$81,363	0.3%
Maui	$1,404,062	$1,614,489	$3,018,551	12.8%
Moloka'i	$39,207	$46,190	$85,397	0.4%
O'ahu	$10,164,579	$7,045,555	$17,210,135	73.1%
Totals	**$ 12,990,432**	**$ 10,550,945**	**$ 23,541,376**	**100%**
County	**Residential Program Investment**	**Business Program Investment**	**PBFA Investment**	**%**
Hawai'i	$1,336,878	$1,809,052	$3,145,931	13.4%
Maui	$1,488,974	$1,696,337	$3,185,311	13.5%
Honolulu	$10,164,579	$7,045,555	$17,210,135	73.1%
Totals	**$ 12,990,432**	**$ 10,550,945**	**$ 23,541,376**	**100%**

Performance Indicator #6: Market Transformation

Targets:

FOCUS AREA	TARGET
Behavior Modification	
Community Workshops	2,500 participant hours
Youth Education Workshops & Presentations	1,000 participant hours
Youth Event Sponsorships	2 events
Enhanced Engagement (Gamification)	1,000 participants
Transformational Videos	10 videos
Professional Development & Technical Training	
Clean Energy Ally Support	8,370 participant hours
Targeted Ally Training Opportunities	
Targeted Participant Training Opportunities	
Educator Training & Grants	
Energy Industry Workforce Development	
Energy In Decision Making	
Continuous Energy Improvement (CEI)	2 cohort participants
Community Based Energy Efficiency	1 cohort participant
Codes & Standards	
Codes Identification & Adoption	9 advocacy events
Code-Related Training & Compliance	70 participant hours
Leading Edge Technologies and Strategies	4 Stakeholder Meetings / 1 Report
Standards Enhancement	3 engagements

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 primary 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 the design and construction community with free technical trainings to understand and implement the International Energy Conservation Code (IECC) 2015 and the county specific amendments to this code. During the legislative session, Hawaiʻi Energy supported the passage of HB556, which implements energy efficient appliance standards. Codes and appliance standards will play a critical role in advancing efficiency and providing customer savings over the next ten to twenty years.

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 a more holistic understanding of the building systems.

Performance Indicator #7: Customer Satisfaction

Target: Overall customer satisfaction score greater than 8.5

The customer satisfaction focus area provides a metric toward Program quality of residential application processing customer experience. This metric is tracked through the experience management tool, Medallia, on a scale of 1 to 10 in three categories: Field Service, Rebate Experience, and Likelihood to Recommend. Achievement of an Overall Customer Satisfaction Score of greater than 8.5 out of 10 results in a 3% performance award achievement, as shown at the bottom of **Table 4**.

In PY19, Hawaii Energy will add a Business customer satisfaction survey to provide insight into business customer experience.

Performance Amount Claim Summary

The Program's Performance Amount Claim for PY18 is $990,060.20 or 98.8% 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, Market Transformation, and Customer Satisfaction results are presented in **Table 4**.

Cumulative Annual Electric Energy Savings (Program-Level) Amount Claim: **$145,562.08**

The Program energy reduction achieved was 123,583,370 kWh, which was 97% of the target of 127,563,746 kWh in the award claim of $145,562.08. This amount is calculated from $112,687.76 for meeting the minimum Milestone level (75%) and $32,874.32 for the remaining savings of 27,910,561 kWh awarded at a rate of $0.001178/kWh achieved beyond the minimum.

Table 10
Energy Reduction Award Claim

Cumulative Annual Electric Energy Savings	**Milestone**	**Target**	
Energy Reduction Award Potential ($)	$ 112,688	$150,250.35	
Energy Reduction Award Pools in Metrics (%)	75%	100%	
Energy Reduction Goals (kWh)	95,672,810	127,563,746	
Energy Reduction Goals Pools in Metrics (%)	75%	100%	
Incentive Calculations	**Meet Milestone**	**Target less Milestone**	**Total**
Pool Award Potential ($)	$ 112,688	$ 37,563	$ 150,250
Energy Goal Pools (kWh)	95,672,810	31,890,937	127,563,746
Award Amount / Rate ($/kWh)	$ 0.001178	$ 0.001178	
Energy Achievement (kWh)	95,672,810	27,910,561	123,583,370
Award Amount / Rate ($/kWh)	$ 0.001178	$ 0.001178	
Energy Achievement Award Calculation ($)	$ 112,687.76	$ 32,874.32	$ 145,562.08
Energy Reduction Performance Award Claim ($)			**$ 145,562.08**

Peak Demand Savings Award Claim: **$145,022.65**

The Combined Peak Demand Reduction was 20,473 kW which was 97% of the target savings level, resulting in an award claim of $145,022.65. This award is calculated from $112,687.76 for meeting the minimum level and $32,334.89 for the additional 4,565 kW for the additional percentage of the target achieved. Levels are awarded at a rate of $7.08361/kW achieved.

Table 11
Demand Reduction Award Claim Summary

Combined Annual Electric Demand Savings	**Milestone**	**Target**	
Demand Reduction Award Potential ($)	$ 112,688	$150,250	
Demand Reduction Award Pools in Metrics (%)	75%	100%	
Demand Reduction Goals (kW)	15,908	21,211	
Demand Reduction Goals Pools in Metrics (%)	75%	100%	
Incentive Calculations	**Meet Milestone**	**Target less Milestone**	**Total**
Pool Award Potential ($)	$ 112,687.76	$ 37,562.59	$ 150,250.35
Demand Goal Pools (kW)	15,908	5,303	21,211
Award Amount / Rate ($/kW)	$ 7.08361	$ 7.08361	
Demand Savings Achievement (kW)	15,908	4,565	20,473
Award Amount / Rate ($/kW)	$ 7.08361	$ 7.08361	
Demand Savings Achievement Award Calculation	$ 112,687.76	$ 32,334.89	$ 145,022.65
Demand Reduction Performance Award Claim			**$ 145,022.65**

Total Resource Benefit (TRB) Award Claim: **$398,974.77**

The TRB achievement of $333,347,497 NPV is 99.6% of the target amount. This award claim of $398,974.77 is calculated from $300,500.70 for meeting the 75% milestone and $98,474.07 for the remaining 24.6%, awarded at a rate of $4,006.68 for each percent achieved beyond the minimum level up to the award target.

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

Table 12
Demand Reduction Award Claim Summary

TRB Target Metrics	**Milestone**	**Target**	
TRB Award Potential ($)	$ 300,501	$400,668	
TRB Award Pools in Metrics (%)	75%	100%	
TRB Goals ($)	$ 251,071,405	$ 334,761,873	
TRB Goals Pools in Metrics (%)	75%	100%	
Incentive Calculations	**Meet Milestone**	**Target less Milestone**	**Total**
Pool Award Potential ($)	$ 300,500.70	$ 100,166.90	$ 400,667.60
TRB Goal Pools in Metrics (%)	75%	25%	100.00%
Award Amount / Rate ($/%)	$ 4,006.68	$ 4,006.68	
TRB Achievement ($)			$333,347,497
TRB Goals ($)			$ 334,761,873
TRB Savings Achievement in Metrics (%)	75%	24.58%	99.58%
Award Amount / Rate ($/%)	$ 4,006.68	$ 4,006.68	
TRB Energy Achievement Award Calculation ($)	$ 300,500.70	$ 98,474.07	$ 398,974.77
TRB NPV of Utility Cost Reduction Performance Award Claim ($)			**$ 398,974.77**

Economically Disadvantaged Award Claim: $70,116.83

The Economically Disadvantaged award is based on the achievement of two Energy Advantage (formerly SBDIL) metrics and two ES4H (formerly Multi-family Direct Install (MFDI)) metrics. The metrics were Energy Advantage energy reduction (kWh), Energy Advantage customers served (total count), ES4H energy reduction (kWh), and ES4H customers served (total count).

In agreement with the Contract Manager and the PUC, each of the four metrics accounted for 25% of the total Economically Disadvantaged award claim. In PY18, the Program exceeded each of the four metrics, as shown in **Table 13,** resulting in the total award claim of $70,116.83.

Table 13
Economically Disadvantaged Award Claim Calculation

Target Metrics	**Milestone**	**Target**	
Award Potential ($)	$ 52,587.62	$ 70,116.83	
Award Pools in Metrics (%)	75%	100%	
Energy Advantage - kWh Target	5,625,000	7,500,000	
Energy Advantage - Customers Served Target	506	675	
ES4H - kWh Target	1,018,387	1,357,849	
ES4H - Customers Served Target	2,769	3,692	
Incentive Calculations	**Meet Milestone**	**Target less Milestone**	**Total Achieved**
Pool Award Potential ($)	$ 52,587.62	$ 17,529.21	$ 70,116.83
Goal Pools in Metrics (%)	75%	25%	100.00%
Award Amount / Rate ($/%)	$ 701.17	$ 701.17	
Energy Advantage - kWh Achievement	5,625,000	2,816,662	8,441,662
Energy Advantage - kWh Target	5,625,000	1,875,000	7,500,000
Target met (Yes/No)	Yes	Yes	
Award - 25%	$ 13,146.91	$ 4,382.30	$ 17,529.21
Energy Advantage - Customers Served Achievement	506	254	760
Energy Advantage - Customers Served Target	506	169	675
Target met?	Yes	Yes	
Award - 25%	$ 13,146.91	$ 4,382.30	$ 17,529.21
ES4H - kWh Achievement	1,018,387	815,312	1,833,699
ES4H - kWh Target	1,018,387	339,462	1,357,849
Target met?	Yes	Yes	
Award - 25%	$ 13,146.91	$ 4,382.30	$ 17,529.21
ES4H - Customers Served Achievement	2,769	1,071	3,840
ES4H - Customers Served Target	2,769	923	3,692
Target met?	Yes	Yes	
Award - 25%	$ 13,146.91	$ 4,382.30	$ 17,529.21
Economically Disadvantaged Performance Award Claim			**$ 70,116.83**

Island Equity (Broad Participation) Award Claim: $100,166.90

The Program achieved the targeted percentages of Island Equity in this PY18 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, where $\frac{\%\ Incentive\ Spend}{\%\ PBF\ Target}$ 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 PY18 Annual Plan. Although Hawai'i and Maui counties contributed more than what was projected in the approved plan, both counties received not only incentives greater than the target, but greater than their total contribution. For example, shown in Table 14 Hawai'i County contributed 13.4% of total PBF funds and the Program distributed 17.7% of incentives to Hawai'i County, therefore achieving a percent spend-to-contribution ratio of 132.3%. Nevertheless, Island Equity is measured against the PBF Target; therefore, in the case of Hawai'i Island, the ratio was 136.0%. Maui County came in at 105.3% of target, outspending the PBF target contribution. The Rapid Response increased incentives on Hawai'i Island led to more efficiency projects and more incentives spent in Hawai'i county, contributing to the much higher ratio for Hawai'i county. See **Table 14** for details.

Table 14
Island Equity Award Claim Calculation

County	PY18 PBF Contribution	PY18 PBF Contribution	PBF Target*	Incentive Spend**	Incentive Spend**	% Incentive Spend / % PBF Contribution	% Incentive Spend / % PBF Target	Target Range	Met Minimum	Award Claim
Honolulu	$17,210,135	73.1%	74.0%	$14,180,399.63	68.6%	93.9%	92.7%	-	Yes	
Hawai'i	$3,145,931	13.4%	13.0%	$3,653,898.39	17.7%	132.3%	136.0%	≥ 80%	Yes	
Maui	$3,185,311	13.5%	13.0%	$2,829,987.92	13.7%	101.2%	105.3%	≥ 80%	Yes	
Total	$23,541,376	100.0%	100.0%	$20,664,285.94	100.00%					$100,166.90
Island Equity Performance Award Claim										**$100,166.90**

The PY18 PBF contribution is based on 1.5% of total utility electric sales as per Hawai'i PUC Order 33764 and reduced for the application of the Green Infrastructure Fee.
*From Table 4
**Incentives include Direct & Transformational Incentives (e.g. 100% incentives spend)

BUDGET PROGRESSION & EXPENDITURES

PY18 Annual Plan Budget

Pursuant to the Program's approved PY18 Annual Plan, the Program's initial budget for the program year was $29.5M, comprised of $18.9M in Incentives, $8.5M in Non-Incentives, and $2.2M in Transformational Incentives. As detailed in **Table 15**, approximately 40% of the services and initiatives budget was allocated to Residential Programs and 60% 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. Specifics of the internal transfers are detailed in Table **16**.

Table 15
PY18 Annual Plan Budget (in $)

Activity	Non-Incentive	Incentive	Total
Residential Programs			
REEM	1,010,000	6,272,063	7,282,063
CREEM	40,000	125,000	165,000
RESM	30,000	418,750	448,750
RHTR	190,000	773,776	963,776
Total Residential Programs	**1,270,000**	**7,589,589**	**8,859,589**
Residential Market Evaluation	**79,820**	**0**	**79,820**
Residential Outreach	**520,000**	**0**	**520,000**
Total Residential Services & Initiatives	**1,869,820**	**7,589,589**	**9,459,409**
Business Programs			
BEEM	780,000	3,437.254	4,217,254
CBEEM	995,000	4,658,529	5,653,529
BESM	95,000	214,883	309,883
BHTR	440,000	2,987,669	3,427,669
Total Business Programs	**2,310,000**	**11,298,335**	**13,608,335**
Business Market Evaluation	**134,730**	**0**	**134,730**
Business Outreach	**360,000**	**0**	**360,000**
Total Business Services and Initiatives	**2,804,730**	**11,298,335**	**14,103,065**
Total Residential and Business Services & Initiatives	**4,674,550**	**18,887,924**	**23,562,474**
Transformational Programs			
Residential Transformational Programs	0	1,051,373	1,051,373
Business Transformational Programs	0	1,098,627	1,098,627
Total Transformation Services & Initiatives	**0**	**2,150,000**	**2,150,000**
Total Supporting Services	**1,752,708**	**0**	**1,752,708**
Total Infrastructure/Facility Fee	476,404	0	476,404
Total Tax on Non-Incentive	325,301	0	325,301
Performance Amount	1,001,670	0	1,001,670
PY18 Additional Non-Incentive Budget	250,000	0	250,000
Total Estimated Contractor Costs *	**8,480,633**	**21,037,924**	**29,518,557**

Internal Budget Transfers

- **November 2018 -** Transferred Business Operations and Management budget as follows: FROM CBEEM ($60,000) TO Business Market Evaluation ($60,000). The transfers were associated with higher spend than in previous years in the area of evaluation as a result of heavy triennial planning activity.

- **December 2018 -** Transferred Residential Operations and Management budget as follows: FROM Residential Outreach ($120,000) TO RESM ($120,000). The transfers were associated with higher spend in the RESM area as a result of greater demand in the VRF Air Conditioning tune-up offering than previously anticipated. Funds were transferred from Residential Outreach, which was temporarily planned at a lower spend in order to re-direct budget to implementation activities.

- **February 2019 –** Transferred Residential Operations and Management budget as follows: FROM Residential Outreach ($40,000) TO Residential Market Evaluation ($40,000). Transferred Residential Incentive budget as follows: FROM REEM ($150,000) TO RESM ($150,000). Transferred Business Operations and Management budget as follows: FROM CBEEM ($70,000) TO Business Market Evaluation ($70,000). The Operations and Management transfers were associated with continued triennial planning activity. The RESM Incentive transfer was associated with greater demand in the VRF Air Conditioning tune-up offering. Funds were transferred from REEM where lighting incentives experienced lower market demand.

- **March 2019 –** Transferred Business Operations and Management budget as follows: FROM CBEEM ($100,000) TO Business Market Evaluation ($100,000). The transfers were associated with higher spend than in previous years in the area of evaluation as a result of heavy triennial planning activity.

- **May 2019 –** Transferred Residential Operations and Management budget as follows: FROM REEM ($80,000) TO CREEM ($10,000), RHTR (20,000) and Residential Outreach (50,000). Transferred Residential Incentive budget as follows: FROM REEM ($100,000) TO RESM ($100,000). Transferred Business Operations and Management budget as follows: FROM CBEEM ($5,000) and BESM ($40,000) TO BEEM (40,000) and Business Outreach ($5,000). The Residential Operations and Management transfers in CREEM and RHTR were completed to align non-incentive funding to year-end incentive spend while awaiting funding modification. The RESM Incentive transfer was associated with greater demand in the VRF Air Conditioning tune-up offering. Funds were transferred from REEM where lighting incentives experienced lower market demand.

- **July 2019** – Reallocated PY18 $250,000 in "additional budget" through supplemental modification #2. In addition, reallocated PY17 unspent funds to PY18 per supplemental modification #2 (total fund carryover was $309,978.30). Carry over funds were allocated to the same categories where they were unspent in PY17. Also completed final year-end re-alignment of funds (Residential and Business Operations Management and Incentives) based on final PY18 incentive spend.

Table 16
Budget Progression 7/1/18-6/30/19

	PY18 Annual Plan Budget	As of 11/2018 (R1)	As of 11/2018 (R1)	As of 12/2018 (R2)	As of 12/2018 (R2)	As of 2/2019 (R3)	As of 2/2019 (R3)	As of 3/2019 (R4)	As of 3/2019 (R4)	As of 5/2019 (R5)	As of 5/2019 (R5)	As of 7/2019 (R6) Mod #2	As of 7/2019 (R6) Mod #2	As of 7/2019 (R7)	As of 7/2019 (R6 & R7)
Residential Programs															
Residential Program Ops and Management															
REEM	$1,010,000.00		$1,010,000.00		$1,010,000.00		$1,010,000.00		$1,010,000.00	(80,000.00)	$930,000.00	$0.00	$1,828.89	$172,650.00	$1,104,478.89
CREEM	$40,000.00		$40,000.00		$40,000.00		$40,000.00		$40,000.00	$10,000.00	$50,000.00	$0.00	$344.59	$5,600.00	$55,944.59
RESM	$30,000.00		$30,000.00	$120,000.00	$150,000.00		$150,000.00		$150,000.00		$150,000.00	$0.00	$381.86	$24,000.00	$174,381.86
RHTR	$190,000.00		$190,000.00		$190,000.00		$190,000.00		$190,000.00	$20,000.00	$210,000.00	$0.00	$473.78	$48,800.00	$259,273.78
Total Residential Programs	$1,270,000.00	$0.00	$1,270,000.00	$120,000.00	$1,390,000.00	$0.00	$1,390,000.00	$0.00	$1,390,000.00	(50,000.00)	$1,340,000.00	$0.00	$3,029.12	$251,050.00	$1,594,079.12
Residential Market Evaluation	$79,820.00		$79,820.00		$79,820.00	$40,000.00	$119,820.00		$119,820.00		$119,820.00	$36,290.01	$4,919.98	(60,800.00)	$100,229.99
Residential Outreach	$520,000.00		$520,000.00	(120,000.00)	$400,000.00	(40,000.00)	$360,000.00		$360,000.00	$50,000.00	$410,000.00		$64,846.81	$11,700.00	$486,546.81
Total Residential Ops & Management	$1,869,820.00	$0.00	$1,869,820.00	$0.00	$1,869,820.00	$0.00	$1,869,820.00	$0.00	$1,869,820.00	$0.00	$1,869,820.00	$36,290.01	$72,795.91	$201,950.00	$2,180,855.92
Residential Incentives															
REEM	$6,272,063.00		$6,272,063.00		$6,272,063.00	(150,000.00)	$6,122,063.00		$6,122,063.00	(100,000.00)	$6,022,063.00		$5,537.00	(15,000.00)	$6,012,600.00
CREEM	$125,000.00		$125,000.00		$125,000.00		$125,000.00		$125,000.00		$125,000.00	$40,000.00	$7,650.00		$172,650.00
RESM	$418,750.00		$418,750.00		$418,750.00	$150,000.00	$568,750.00		$568,750.00	$100,000.00	$668,750.00		$1,012.50	$5,000.00	$674,762.50
RHTR	$773,776.00		$773,776.00		$773,776.00		$773,776.00		$773,776.00		$773,776.00		$54,901.47	$10,000.00	$838,677.47
Subtotal Residential Incentives	$7,589,589.00	$0.00	$7,589,589.00	$0.00	$7,589,589.00	$0.00	$7,589,589.00	$0.00	$7,589,589.00	$0.00	$7,589,589.00	$40,000.00	$69,100.97	$0.00	$7,698,689.97
Residential Transformational	$1,051,373.00		$1,051,373.00		$1,051,373.00		$1,051,373.00		$1,051,373.00		$1,051,373.00		$17,707.74		$1,069,080.74
Total Residential Incentives	$8,640,962.00	$0.00	$8,640,962.00	$0.00	$8,640,962.00	$0.00	$8,640,962.00	$0.00	$8,640,962.00	$0.00	$8,640,962.00	$40,000.00	$86,808.71	$0.00	$8,767,770.71
Total Residential Programs	**$10,510,782.00**	**$0.00**	**$10,510,782.00**	**$0.00**	**$10,510,782.00**	**$0.00**	**$10,510,782.00**	**$0.00**	**$10,510,782.00**	**$0.00**	**$10,510,782.00**	**$76,290.01**	**$159,604.62**	**$201,950.00**	**$10,948,626.63**
Business (C&I) Programs															
Business Programs Ops and Management															
BEEM	$780,000.00		$780,000.00		$780,000.00		$780,000.00		$780,000.00	$40,000.00	$820,000.00	$0.00	$19,460.33	$50,000.00	$889,460.33
CBEEM	$995,000.00	(60,000.00)	$935,000.00		$935,000.00	(70,000.00)	$865,000.00	(100,000.00)	$765,000.00	(5,000.00)	$760,000.00	$0.00	$38,538.87	(60,000.00)	$738,538.87
BESM	$95,000.00		$95,000.00		$95,000.00		$95,000.00		$95,000.00	(40,000.00	$55,000.00	$0.00	$8,088.97	$0.00	$63,088.97
BHTR	$440,000.00		$440,000.00		$440,000.00		$440,000.00		$440,000.00		$440,000.00	$0.00	$294.08	$10,000.00	$450,294.08
Total Business Programs	$2,310,000.00	(60,000.00)	$2,250,000.00	$0.00	$2,250,000.00	(70,000.00)	$2,180,000.00	(100,000.00)	$2,080,000.00	(5,000.00)	$2,075,000.00	$0.00	$66,382.25	$0.00	$2,141,382.25
Business Market Evaluation	$134,730.00	$60,000.00	$194,730.00		$194,730.00	$70,000.00	$264,730.00	$100,000.00	$364,730.00		$364,730.00	$54,435.02	$3.91		$419,168.93
Business Outreach	$360,000.00		$360,000.00		$360,000.00		$360,000.00		$360,000.00	$5,000.00	$365,000.00	$0.00	$47,484.56		$412,484.56
Total Business Ops & Management	$2,804,730.00	$0.00	$2,804,730.00	$0.00	$2,804,730.00	$0.00	$2,804,730.00	$0.00	$2,804,730.00	$0.00	$2,804,730.00	$54,435.02	$113,870.72	$0.00	$2,973,035.74
Business Incentives															
BEEM	$3,437,254.00		$3,437,254.00		$3,437,254.00		$3,437,254.00		$3,437,254.00		$3,437,254.00	$0.00	$131.44	$380,000.00	$3,817,385.44
CBEEM	$4,658,529.00		$4,658,529.00		$4,658,529.00		$4,658,529.00		$4,658,529.00		$4,658,529.00	$0.00	$2,391.67	(25,000.00)	$4,635,920.67
BESM	$214,883.00		$214,883.00		$214,883.00		$214,883.00		$214,883.00		$214,883.00	$0.00	$2,150.00	$0.00	$217,033.00
BHTR	$2,987,669.00		$2,987,669.00		$2,987,669.00		$2,987,669.00		$2,987,669.00		$2,987,669.00	$0.00	$985.61	(355,000.00)	$2,633,654.61
Subtotal Business Incentives	$11,298,335.00	$0.00	$11,298,335.00	$0.00	$11,298,335.00	$0.00	$11,298,335.00	$0.00	$11,298,335.00	$0.00	$11,298,335.00	$0.00	$5,658.72	$0.00	$11,303,993.72
Business Transformational	$1,098,627.00		$1,098,627.00		$1,098,627.00		$1,098,627.00		$1,098,627.00		$1,098,627.00	$40,000.00	$17,656.49		$1,156,283.49
Total Business Incentives	$12,396,962.00	$0.00	$12,396,962.00	$0.00	$12,396,962.00	$0.00	$12,396,962.00	$0.00	$12,396,962.00	$0.00	$12,396,962.00	$40,000.00	$23,315.21	$0.00	$12,460,277.21
Total Business Programs	**$15,201,692.00**	**$0.00**	**$15,201,692.00**	**$0.00**	**$15,201,692.00**	**$0.00**	**$15,201,692.00**	**$0.00**	**$15,201,692.00**	**$0.00**	**$15,201,692.00**	**$94,435.02**	**$137,185.93**	**$0.00**	**$15,433,312.95**
Supporting Services	**$1,752,708.00**	**$0.00**	**$1,752,708.00**	**$0.00**	**$1,752,708.00**	**$0.00**	**$1,752,708.00**	**$0.00**	**$1,752,708.00**	**$0.00**	**$1,752,708.00**	**$71,625.03**	**$4,194.35**	**(201,950.00)**	**$1,626,577.38**
Infrastructure/Facility Fee	**$476,404.00**	**$0.00**	**$476,404.00**	**$0.00**	**$476,404.00**	**$0.00**	**$476,404.00**	**$0.00**	**$476,404.00**	**$0.00**	**$476,404.00**	**$0.00**	**$0.04**	**$0.00**	**$476,404.04**
Subtotal Non-Incentive (Prior to Tax)	$6,903,662.00	$0.00	$6,903,662.00	$0.00	$6,903,662.00	$0.00	$6,903,662.00	$0.00	$6,903,662.00	$0.00	$6,903,662.00	$162,350.06	$190,861.02	$0.00	$7,256,873.08
Total Tax on Non-Incentive	$325,301.00	$0.00	**$325,301.00**	$0.00	**$325,301.00**	$0.00	**$325,301.00**	$0.00	**$325,301.00**	$0.00	**$325,301.00**	$7,649.94	$8,993.36	$0.00	**$341,944.31**
Performance Amount (Inclusive of Tax)	$1,001,670.00		$1,001,670.00		$1,001,670.00		$1,001,670.00		$1,001,670.00		$1,001,670.00	$0.00	$0.00	$0.00	$1,001,670.00
Subtotal Non-Incentives	***$8,230,633.00***	***$0.00***	***$8,230,633.00***	***$0.00***	***$8,230,633.00***	***$0.00***	***$8,230,633.00***	***$0.00***	***$8,230,633.00***	***$0.00***	***$8,230,633.00***	***$170,000.00***	***$199,854.38***	***$0.00***	***$8,600,487.39***
Subtotal Residential & Business Customer Incentives	***$18,887,924.00***	***$0.00***	***$18,887,924.00***	***$0.00***	***$18,887,924.00***	***$0.00***	***$18,887,924.00***	***$0.00***	***$18,887,924.00***	***$0.00***	***$18,887,924.00***	***$40,000.00***	***$74,759.69***	***$0.00***	***$19,002,683.69***
Subtotal Transformational Incentives	***$2,150,000.00***	***$0.00***	***$2,150,000.00***	***$0.00***	***$2,150,000.00***	***$0.00***	***$2,150,000.00***	***$0.00***	***$2,150,000.00***	***$0.00***	***$2,150,000.00***	***$40,000.00***	***$35,364.23***	***$0.00***	***$2,225,364.23***
Subtotal Customer & Transformational Incentives	***$21,037,924.00***	***$0.00***	***$21,037,924.00***	***$0.00***	***$21,037,924.00***	***$0.00***	***$21,037,924.00***	***$0.00***	***$21,037,924.00***	***$0.00***	***$21,037,924.00***	***$80,000.00***	***$110,123.92***	***$0.00***	***$21,228,047.92***
PY18 Additional Non-Incentive Budget	***$250,000.00***	***$0.00***	***$250,000.00***	***$0.00***	***$250,000.00***	***$0.00***	***$250,000.00***	***$0.00***	***$250,000.00***	***$0.00***	***$250,000.00***	***(250,000.00)***	***$0.00***		***$0.00***
Total Estimated Contractor Costs	**$29,518,557.00**	**$0.00**	**$29,518,557.00**	**$0.00**	**$29,518,557.00**	**$0.00**	**$29,518,557.00**	**$0.00**	**$29,518,557.00**	**$0.00**	**$29,518,557.00**	**$0.00**	**$309,978.30**	**$0.00**	**$29,828,535.31**

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 98% of budgeted Incentives, 97% of budgeted Non-Incentives (excludes performance amounts), and 90% of budgeted Transformational Incentives. Details of final PY18 expenditures and unspent funds by program categories are shown in **Table 17**. Specific discussions related to each Residential and Business program are provided within those respective sections.

Table 17
Program Expenditures and Unspent Funds

	Total Expenditures	PY18 Budget (R7)	Percent Spent	Unspent	Percent Unspent
Residential Programs					
Residential Program Ops and Management					
REEM	$1,104,451.74	$1,104,478.89	$1.00	$27.15	$0.00
CREEM	$55,930.57	$55,944.59	$1.00	$14.02	$0.00
RESM	$174,325.87	$174,381.86	$1.00	$55.99	$0.00
RHTR	$259,169.21	$259,273.78	$1.00	$104.57	$0.00
Total Residential Programs	$1,593,877.39	$1,594,079.12	$1.00	$201.73	$0.00
Residential Evaluation	$100,182.20	$100,229.99	$1.00	$47.79	$0.00
Residential Outreach	$486,467.15	$486,546.81	$1.00	$79.66	$0.00
Total Residential Non-Incentives	**$2,180,526.74**	**$2,180,855.92**	**$1.00**	**$329.18**	**$0.00**
Residential Incentives					
REEM	$5,783,008.90	$6,012,600.00	$0.96	$229,591.10	$0.04
CREEM	$85,550.00	$172,650.00	$0.50	$87,100.00	$0.50
RESM	$672,650.00	$674,762.50	$1.00	$2,112.50	$0.00
RHTR	$834,016.98	$838,677.47	$0.99	$4,660.49	$0.01
Subtotal Residential Incentives	$7,375,225.88	$7,698,689.97	$0.96	$323,464.09	$0.04
Residential Transformational	$1,028,706.40	$1,069,080.74	$0.96	$40,374.34	$0.04
Total Residential Incentives	**$8,403,932.28**	**$8,767,770.71**	**$0.96**	**$363,838.43**	**$0.04**
Total Residential Programs	**$10,584,459.02**	**$10,948,626.63**	**$0.97**	**$364,167.61**	**$0.03**
Business Programs					
Business Programs Ops and Management					
BEEM	$889,243.39	$889,460.33	$1.00	$216.94	$0.00
CBEEM	$599,319.30	$738,538.87	$0.81	$139,219.57	$0.19
BESM	$26,079.53	$63,088.97	$0.41	$37,009.44	$0.59
BHTR	$446,179.33	$450,294.08	$0.99	$4,114.75	$0.01
Total Business Programs	$1,960,821.55	$2,141,382.25	$0.92	$180,560.70	$0.08
Business Evaluation	$378,307.17	$419,168.93	$0.90	$40,861.76	$0.10
Business Outreach	$392,408.76	$412,484.56	$0.95	$20,075.80	$0.05
Total Business Non-Incentives	**$2,731,537.48**	**$2,973,035.74**	**$0.92**	**$241,498.26**	**$0.08**
Business Incentives					
BEEM	$3,815,295.14	$3,817,385.44	$1.00	$2,090.30	$0.00
CBEEM	$4,631,695.33	$4,635,920.67	$1.00	$4,225.34	$0.00
BESM	$213,436.27	$217,033.00	$0.98	$3,596.73	$0.02
BHTR	$2,632,266.05	$2,633,654.61	$1.00	$1,388.56	$0.00
Subtotal Business Incentives	$11,292,692.79	$11,303,993.72	$1.00	$11,300.93	$0.00
Business Transformational	$967,660.88	$1,156,283.49	$0.84	$188,622.61	$0.16
Total Business Incentives	**$12,260,353.67**	**$12,460,277.21**	**$0.98**	**$199,923.54**	**$0.02**
Total Business Programs	**$14,991,891.15**	**$15,433,312.95**	**$0.97**	**$441,421.80**	**$0.03**
Total Services and Initiatives	**$25,576,350.17**	**$26,381,939.58**	**$0.97**	**$805,589.41**	**$0.03**
Supporting Services	**$1,625,122.01**	**$1,626,577.38**	**$1.00**	**$1,455.37**	**$0.00**
Infrastructure/Facility Fee	**$476,403.96**	**$476,404.04**	**$1.00**	**$0.08**	**$0.00**
Subtotal Non-Incentives (Prior to Tax)	$7,013,590.19	$7,256,873.08	$0.97	$243,282.89	$0.03
Total Tax on Non-Incentive	$330,480.45	$341,944.31	$0.97	$11,463.86	$0.03
Performance Amount (Inclusive of Tax)	$0.00	$1,001,670.00	$0.00	$1,001,670.00	$1.00
Subtotal Non-Incentives Billed	*$7,344,070.64*	*$8,600,487.39*	$0.85	$1,256,416.75	$0.15
Subtotal Residential and Business Customer Incentives	*$18,667,918.67*	*$19,002,683.69*	$0.98	$334,765.02	$0.02
Subtotal Transformational Incentives	*$1,996,367.28*	*$2,225,364.23*	$0.90	$228,996.95	$0.10
Subtotal Customer and Transformational incentives	*$20,664,285.95*	*$21,228,047.92*	$0.97	$563,761.97	$0.03
Total Estimated Contractor Costs	**$28,008,356.59**	**$29,828,535.31**	**$0.94**	**$1,820,178.72**	**$0.06**

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 PY2018 annual report *Portfolio Impacts* section follows the reorganization from the PY2017 annual report, focusing on the Program-Level Savings while 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 Annual 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 PY18 were:

- **First-Year** – 123,583,370 kWh (36% in Residential and 64% in Business programs)
- **Lifetime** – 1,653,067,787 kWh (27% in Residential and 73% for Business programs)

The difference in percentage contributions between first-year and lifetime savings between Residential and Business portfolios was traditionally due to Residential measures having a relatively shorter life (notably the Peer Group Comparison, which has only a 1-year useful life). However, in PY18, the savings gap was widened by a reduction in Residential lighting savings per lamp. Residential measures have an average measure life of 10.2 years in PY18, down from 11.1 years in PY17 and 10.3 years in PY16, though up from 9.5 years in PY15 and 8.0 years in PY14. Business measures have an average measure life of 15.2 years in PY18, up from 14.2 years in PY17, 13.9 years in PY16, 12.7 years in PY15 and 12.6 years in PY14. Historically, LED lighting was a significant contributor to lifetime energy savings. Both the Business and Residential portfolios saw a decrease in LED savings in PY18. The Residential portfolio intentionally diversified away from LED lighting, expanding with several new offers. The Business portfolio continued to focus on deeper energy savings beyond lighting, seeing this measurably in a decrease in midstream participation. However, the Business portfolio significantly increased in HVAC projects with 300% more chiller project savings, 200% more Split-System A/C savings, and 50% more Hotel Room EMS savings than in PY17, offsetting the decrease.

Program Peak Demand reduction for PY18 was:

- **Peak Demand** – 20,473 kW (47% from Residential and 53% from Business)

Table 18 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 Customer-Level or System-Level Savings, see **Appendix A**.

Table 18
Program-Level Impact Summary by Program

Program	Apps Processed	Item Quantity	Incentives ($)	Demand Impact (kW)	1st Year Energy Impact (kWh 1st Yr)	Lifetime Energy Impact (kWh Life)	1st Year Impact Cost ($/kWh)	Lifetime Impact Cost $/kWh)	Total Resource Benefit (TRB)	Total Resource Cost (TRC)	Driven Benefit Ratio	Driven Investment Ratio	Benefit Test
BEEM	879	277,195	$3,815,295	5,571	39,264,799	622,008,663	$0.097	$0.006	$126,418,957	$27,920,124	33.1	7.3	4.5
CBEEM	304	351	$4,631,695	4,092	29,165,816	434,180,694	$0.159	$0.011	$80,566,061	$19,446,984	17.4	4.2	4.1
BESM	271	271	$213,436	48	637,280	5,795,603	$0.335	$0.037	$1,056,087	$31,216,611	4.9	146.3	0.0
BHTR	1,174	52,980	$2,632,266	1,235	9,859,204	137,376,918	$0.267	$0.019	$27,739,147	$2,936,422	10.5	1.1	9.4
Total Commercial	**2,628**	**330,797**	**$11,292,693**	**10,946**	**78,927,099**	**1,199,361,878**	**$0.143**	**$0.009**	**$235,780,253**	**$81,520,141**	**20.9**	**7.2**	**2.9**
REEM	11,648	3,688,731	$5,783,009	8,564	40,543,675	430,850,481	$0.143	$0.013	$92,112,305	$51,560,286	15.9	8.9	1.8
CREEM	21	21	$85,550	23	162,877	771,820	$0.525	$0.111	$180,816	$85,550	2.1	1.0	2.1
RESM	6,890	6,890	$672,650	421	2,119,716	4,207,479	$0.317	$0.160	$855,403	$2,067,150	1.3	3.1	0.4
RHTR	2,848	40,389	$834,017	519	1,830,003	17,876,130	$0.456	$0.047	$4,418,720	$834,017	5.3	1.0	5.3
Total Residential	**21,407**	**3,736,031**	**$7,375,226**	**9,527**	**44,656,271**	**453,705,910**	**$0.165**	**$0.016**	**$97,567,244**	**$54,547,003**	**13.2**	**7.4**	**1.8**
Total	**24,035**	**4,066,828**	**$18,667,919**	**20,473**	**123,583,370**	**1,653,067,787**	**$0.151**	**$0.011**	**$333,347,497**	**$136,067,145**	**17.9**	**7.3**	**2.4**

Driven Benefit Ratio = TRB/Incentive $ *Driven Investment Ration = TRC/Incentive $* *Benefit Test = TRB/TRC*

Savings at Program Level

Measure Contribution toward Savings Impacts

In PY18, the Program incentivized 106 reporting equipment types in 24 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 19** provides a summary of all measure categories and their respective energy impact for PY18.

- **#1 Contributor: High-Efficiency Lighting** – 40.5% first-year (down from 58.6% in PY17) and 44.8% lifetime energy savings (down from 67.4% in PY17).
- **#2 Contributor: Customized Project Measures** – 26.6% first-year and 29.2% lifetime energy savings. Non-prescriptive lighting projects constituted the majority of projects in this category.
- **#3 Contributor: High-Efficiency HVAC** – 13.0% first-year and 15.4% lifetime energy savings. Chillers, Split Systems and hotel room Energy Management Systems (EMS) were the most significant contributors to this category.

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**.

Table 19
Contribution by Equipment Category in Order of Lifetime Energy Impact

Rank	Category	Apps	Apps (Pct)	Measure Quantity	Program Demand (kW)	Program Demand (%)	Program Energy 1st Year (kWh)	Program Energy 1st Year	Program Energy Lifetime (kWh)	Program Energy Lifetime (%)	Incentives	Incentives	Lifetime Cost ($/kWh)
1	High Efficiency Lighting	3,024	12.6%	1,516,332	5,713	27.9%	50,017,401	40.5%	739,876,211	44.8%	$6,255,150	33.5%	$0.008
2	Customized Project Measures	424	1.8%	7,376	4,527	22.1%	32,854,986	26.6%	482,250,565	29.2%	$5,871,363	31.5%	$0.012
3	High Efficiency HVAC	7,551	31.4%	9,595	3,788	18.5%	16,016,151	13.0%	254,272,284	15.4%	$2,188,811	11.7%	$0.009
4	High Efficiency Appliances	6,615	27.5%	15,131	830	4.1%	5,106,739	4.1%	67,941,504	4.1%	$1,132,862	6.1%	$0.017
5	High Efficiency Water Heating	3,744	15.6%	3,824	686	3.4%	3,655,657	3.0%	60,851,143	3.7%	$1,330,582	7.1%	$0.022
6	Energy Awareness, Measurement & Control Systems	68	0.3%	2,484,426	4,060	19.8%	12,212,551	9.9%	12,786,673	0.8%	$27,402	0.1%	$0.002
7	Consumer Electronics	59	0.2%	16,333	141	0.7%	1,171,792	0.9%	7,042,915	0.4%	$163,170	0.9%	$0.023
8	High Efficiency Water Pumping	157	0.7%	163	39	0.2%	473,181	0.4%	6,726,007	0.4%	$90,355	0.5%	$0.013
9	Commercial Kitchen	13	0.1%	31	60	0.3%	342,458	0.3%	5,002,626	0.3%	$76,675	0.4%	$0.015
10	High Efficiency Motors	11	0.0%	1,352	35	0.2%	286,152	0.2%	4,292,277	0.3%	$78,900	0.4%	$0.018
11	Energy Conservation - Hot Water	1,534	6.4%	7,641	455	2.2%	820,929	0.7%	4,104,644	0.2%	$159,805	0.9%	$0.039
12	Building Envelope Improvements	19	0.1%	4,112	92	0.4%	356,853	0.3%	3,568,527	0.2%	$58,946	0.3%	$0.017
13	High Efficiency Air Conditioning	259	1.1%	460	41	0.2%	127,702	0.1%	2,554,036	0.2%	$34,500	0.2%	$0.014
14	Business Design, Audits & Commissioning	3	0.0%	3	8	0.0%	109,429	0.1%	1,641,435	0.1%	$36,881	0.2%	$0.022
15	Commercial Industrial Processes	5	0.0%	48	0	0.0%	31,388	0.0%	156,939	0.0%	$7,820	0.0%	$0.050
16	Accounting	548	2.3%	0	0	0.0%	0	0.0%	0	0.0%	$1,149,698	6.2%	$0.000
17	Energy Study	1	0.0%	1	0	0.0%	0	0.0%	0	0.0%	$5,000	0.0%	$0.000
	Total	**24,035**	**100.0%**	**4,066,828**	**20,473**	**100.0%**	**123,583,370**	**100.0%**	**1,653,067,787**	**100.0%**	**$18,667,919**	**100.0%**	**$0.011**

Energy Efficiency Portfolio Standard (EEPS) Impacts

Tracking Progress Toward EEPS Goal

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 Hawaiʻi 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 study, published in 2014, indicated that the 4,300 GWh EEPS goal can likely be met cost-effectively.

The most recent legislative report from the Hawaiʻi PUC, published December 2018, provides a progress update of the First EEPS Performance Period (2009-2015). Energy reduction data as recent as 2017 is also reported where applicable, including for the Hawaiʻi Energy program.

The following are the key findings and figure excerpted from the Study[4]

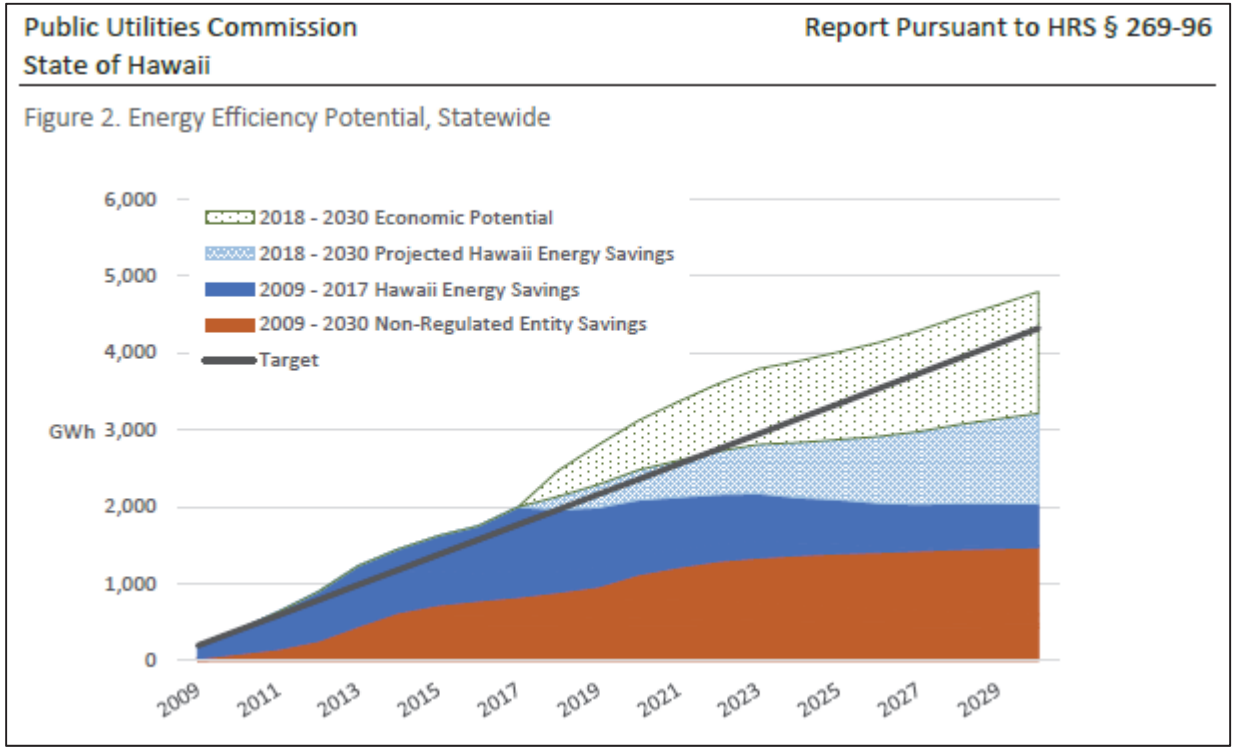
1. **The EEPS goal has been effective at accelerating deployment of energy efficiency resources throughout the State.** During the First EEPS Performance Period (2009-2015), Hawaiʻi achieved an estimated 2,030 GWh of electricity savings, exceeding the 2015 goal of 1,375 GWh of energy savings by nearly 50%. An additional 530 GWh of savings was achieved in 2016-2017. However, many of the most cost-effective energy efficiency opportunities have now been captured, which suggests that future investment will need to increase in order to continue to meet Hawaiʻi's ambitious energy efficiency goals.
2. **Hawaiʻi Energy, the State's ratepayer-funded energy efficiency program administrator, is an essential component of the State's efforts to capture cost-effective energy efficiency savings opportunities.** Hawaiʻi Energy has delivered 1,106 GWh of energy savings, over 80% of the First EEPS Performance Period goal. Energy savings delivered by Hawaiʻi Energy have reduced peak demand by 150 megawatts ("MW") and will help customers save an estimated $3.7 billion on their electricity bills over the life of the installed efficiency measures. Hawaiʻi Energy has also provided a specialized focus on enabling low-income and other hard-to-reach customers to participate in the benefits of clean energy.
3. **Energy efficiency remains a lower cost resource than most other energy options, while providing many other important benefits to Hawaiʻi's electric utilities and ratepayers.** However, Hawaiʻi's energy landscape has evolved significantly since the EEPS goal was established in 2009. Given the substantial increase in renewable energy available in Hawaiʻi (such as solar PV and wind), it is no longer a given that energy efficiency will always displace fossil fuel generation. As customers continue to invest in low-cost renewable energy and increasingly, energy storage, energy efficiency programs and investments must be integrated with other clean energy initiatives. Going forward, energy efficiency investments that provide time- and location-specific value to the grid are likely to be best-suited to offset traditional grid investments. As a result, a business as usual approach is not likely to be sufficient to achieve the 2030 EEPS goal. More aggressive and creative programming methods will be necessary to cost-effectively capture future energy efficiency savings. The Commission will consider whether changes to the EEPS Framework, including its goals and metrics, are needed to support efforts to increase future energy savings.

Energy Savings towards EEPS Goal

The targeted EEPS goal is a 4,300 GWh reduction in 2030 (shown in **Figure 4**). Per the legislative report, "These preliminary findings…suggest that the EEPS goal is achievable, but requires strategic adaptation, possible increases in energy efficiency program budgets, and continued innovation in program design." In PY18, Hawaiʻi Energy continued to provide valuable energy savings and, in addition, notably addressed non-regulated entity savings through support for adoption of State appliance standards and County-level energy code.

[4] *https://puc.hawaii.gov/wp-content/uploads/2018/12/EEPS-2019-Legislative-Report_FINAL.pdf*

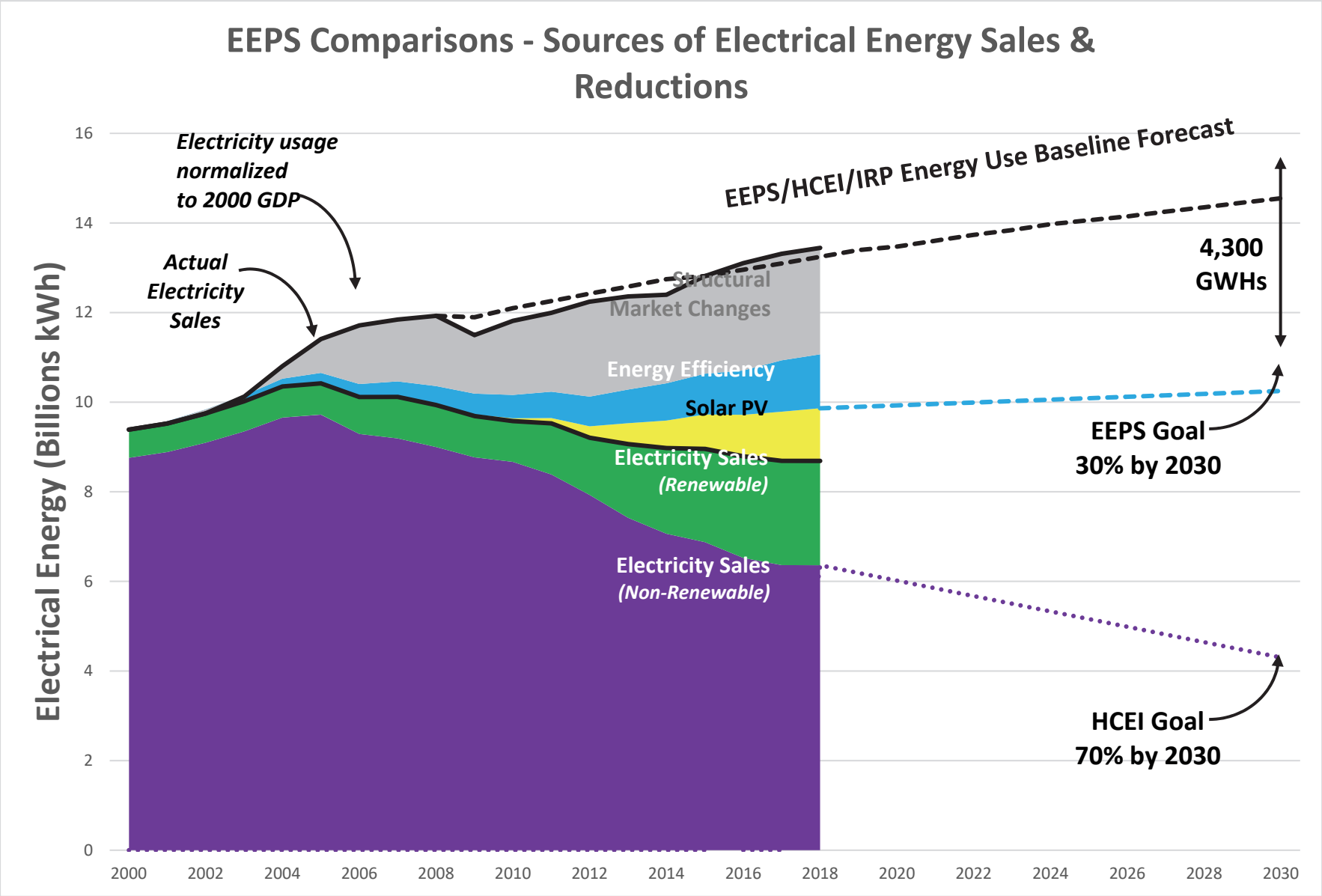
Figure 3: Statewide Energy Efficiency Potential



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

Figure 4 provides a high-level view of the impacts and orders of magnitude that various activities have and may have on electrical consumption in Hawaiʻi from 2000 to 2030. The items shown are:

Figure 4: EEPS Goal and Tracking



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 Hawaiian Electric 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, due to PGV plant not operating, the RPS percentage is largely unchanged from last year.

B. *Solar PV Production* (yellow area) – This line adds in the energy use that distributed PV systems are estimated to generate. In 2018, it is estimated that the PV systems generated 1,175 GWh[5].

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.

[5] *Based on Hawaiian Electric's Quarterly Installed Solar Data, which cited 745 MW of installed PV; 4.8 sun hours and 0.9 conversion factor was assumed.*

Portfolio Impacts Relative to Load

Table 20, Table 21, and Table **22** show the Program and Customer Level impacts as compared to PY18 electricity sales. Monthly data available from DBEDT's data warehouse enabled the Program to calculate electricity sales, power generated and power purchased by Program Year for a relevant comparison to Program savings. Peak demand, shown in Table **22,** comes from the Hawaiian Electric Industries' 10-K Consolidated Financial Report and is reported on a calendar-year basis.

For PY18, Customer-level savings were equivalent to 1.71% of the 2018 annual energy sales and 1.28% 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
Hawaiʻi	1,043,657,714	20,580,498	1.97%	0.24%	17,228,489	1.65%	0.20%
Lānaʻi	29,906,898	349,232	1.17%	0.004%	373,284	1.25%	0.004%
Maui	1,033,724,167	17,603,222	1.70%	0.21%	14,640,602	1.42%	0.17%
Molokaʻi	29,085,398	317,249	1.09%	0.004%	313,255	1.08%	0.004%
Oʻahu	6,447,526,776	107,718,394	1.67%	1.25%	91,027,740	1.41%	1.06%
Total	**8,583,900,953**	**146,568,596**		**1.71%**	**123,583,370**		**1.44%**

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

Table 21
HECO Sales vs. Generated & Purchased

HECO Consolidated Operating Statistics*	kWh/Yr	%
Net Generated and Purchased	9,321,311,585	100.00%
Sales	8,583,900,953	92.09%
System Losses and Use	**737,410,632**	**7.91%**

*DBEDT Monthly Energy Trends

Table 22
Demand Impacts vs. Sales

Island	2018 kW Peak*	Customer Level kW Reduction	% of Island Peak	% of Total Peak	Program Level kW Reduction	% of Island Peak	% of Total Peak
Hawaiʻi	190,800	3,293	1.73%	0.21%	2,864	1.50%	0.18%
Lānaʻi	5,400	101	1.88%	0.01%	110	2.03%	0.01%
Maui	206,200	2,649	1.28%	0.17%	2,296	1.11%	0.14%
Molokaʻi	6,000	64	1.07%	0.00%	65	1.08%	0.00%
Oʻahu	1,190,000	17,386	1.46%	1.09%	15,139	1.27%	0.95%
Total	**1,598,400**	**23,493**		**1.47%**	**20,473**		**1.28%**

* HEI 2018 10-K Report (Noncoincident and nonintegrated)

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

Total Resource Benefit (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 $333,347,497. Table **23** shows the measures and their relative contributions.

The top three measure categories, shown in Table **23**, provided 88% 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 $145,411,161 (43.6%).
- *Customized Projects* – The second measure to offer significant contribution at $90,236,775 (27.1%) were customized projects.
- *High-Efficiency HVAC* – The third largest measure contributing to the TRB at $58,859,257 (17.7%) was High-Efficiency HVAC.

The top three measures, which can cross categories (e.g., High-Efficiency Lighting in Customized Projects), as shown in **Appendix A**, provided 53.1% of the TRB value. They are LED Lighting, Custom Lighting, and LED Linear.

- *LED Lighting* – The largest contributor to the TRB at $67,197,862 (20.2%).
- *Custom Lighting* – The second largest measure, offering significant contribution at $56,286,390 (16.9%), was customized projects.
- *LED Linear* – The third largest measure contributing to the TRB at $53,617,565 (16.1%).

Figure 5: Example of TRB Value Calculation (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.
PY18	2018	1	1.00	$-	$0.176	$-	$0.176	$-	$0.176
PY19	2019	2	0.94	$-	$0.181	$-	$0.171	$-	$0.347
PY20	2020	3	0.89	$904.0	$0.187	$805	$0.166	$805	$0.513
PY21	2021	4	0.84	$986.0	$0.192	$828	$0.161	$1,633	$0.674
PY22	2022	5	0.79	$856.0	$0.198	$678	$0.157	$2,311	$0.831
PY23	2023	6	0.75	$750.0	$0.204	$560	$0.152	$2,871	$0.983
PY24	2024	7	0.70	$663.0	$0.210	$467	$0.148	$3,338	$1.131
PY25	2025	8	0.67	$590.0	$0.216	$392	$0.144	$3,730	$1.275
PY26	2026	9	0.63	$527.0	$0.223	$331	$0.140	$4,061	$1.415
PY27	2027	10	0.59	$474.0	$0.230	$281	$0.136	$4,342	$1.551
PY28	2028	11	0.56	$1,020.0	$0.236	$570	$0.132	$4,912	$1.683
PY29	2029	12	0.53	$1,066.0	$0.244	$562	$0.128	$5,474	$1.811
PY30	2030	13	0.50	$964.0	$0.251	$479	$0.125	$5,953	$1.936
PY31	2031	14	0.47	$875.0	$0.258	$410	$0.121	$6,363	$2.057
PY32	2032	15	0.44	$795.0	$0.266	$352	$0.118	$6,715	$2.175
PY33	2033	16	0.42	$724.0	$0.274	$302	$0.114	$7,017	$2.289
PY34	2034	17	0.39	$-	$0.282	$-	$0.111	$7,017	$2.400
PY35	2035	18	0.37	$-	$0.291	$-	$0.108	$7,017	$2.508
PY36	2036	19	0.35	$-	$0.300	$-	$0.105	$7,017	$2.613
PY37	2037	20	0.33	$-	$0.308	$-	$0.102	$7,017	$2.715
PY38	2038	21	0.31	$-	$0.318	$-	$0.099	$7,017	$2.814
PY39	2039	22	0.29	$-	$0.327	$-	$0.096	$7,017	$2.910
PY40	2040	23	0.28	$-	$0.337	$-	$0.094	$7,017	$3.004
PY41	2041	24	0.26	$-	$0.347	$-	$0.091	$7,017	$3.095
PY42	2042	25	0.25	$-	$0.358	$-	$0.088	$7,017	$3.183

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

The net TRB of $333,347,497 is based on the Program's latest TRB calculation (revised in PY15) 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.

PY18 Program Savings were achieved with an estimated TRC of $136,067,145 as shown in Table **23**. The largest customer investments or TRC were in the categories of High-Efficiency HVAC at $33,793,442 (24.8%), High-Efficiency Lighting at $27,598,268 (20.3%), and Customized Project Measures at $20,881,222 (15.3%).

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 2.4 indicates that society is getting a 2.4x return (or 240%) on its 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 greenhouse gas emissions or improvement in water efficiency. Refer to the TRB/TRC columns in Table **23** for details. **Appendix A** lists the TRB/TRC ratio for individual measures.

Table 23
Measure Portfolio Total Resource Benefit and Costs (TRB & TRC)

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	5,713	27.9%	50,017,401	40.5%	739,876,211	44.8%	14.8	5.3	$145,411,161	43.6%	$27,598,268	20.3%	$6,255,150	33.5%
Customized Project Measures	4,527	22.1%	32,854,986	26.6%	482,250,565	29.2%	14.7	4.3	$90,236,775	27.1%	$20,881,222	15.3%	$5,871,363	31.5%
High Efficiency HVAC	3,788	18.5%	16,016,151	13.0%	254,272,284	15.4%	15.9	1.7	$58,859,257	17.7%	$33,793,442	24.8%	$2,188,811	11.7%
High Efficiency Appliances	830	4.1%	5,106,739	4.1%	67,941,504	4.1%	13.3	1.9	$15,097,178	4.5%	$8,146,386	6.0%	$1,132,862	6.1%
High Efficiency Water Heating	686	3.4%	3,655,657	3.0%	60,851,143	3.7%	16.6	1.2	$12,826,058	3.8%	$10,747,633	7.9%	$1,330,582	7.1%
Energy Awareness, Measurement and Control Systems	4,060	19.8%	12,212,551	9.9%	12,786,673	0.8%	1.0	33.3	$2,506,070	0.8%	$75,180	0.1%	$27,402	0.1%
Consumer Electronics	141	0.7%	1,171,792	0.9%	7,042,915	0.4%	6.0	0.8	$1,558,177	0.5%	$1,916,460	1.4%	$163,170	0.9%
High Efficiency Water Pumping	39	0.2%	473,181	0.4%	6,726,007	0.4%	14.2	2.3	$1,239,785	0.4%	$543,500	0.4%	$90,355	0.5%
Commercial Kitchen	60	0.3%	342,458	0.3%	5,002,626	0.3%	14.6	4.7	$1,122,065	0.3%	$237,000	0.2%	$76,675	0.4%
High Efficiency Motors	35	0.2%	286,152	0.2%	4,292,277	0.3%	15.0	2.9	$854,681	0.3%	$299,187	0.2%	$78,900	0.4%
Energy Conservation - Hot Water	455	2.2%	820,929	0.7%	4,104,644	0.2%	5.0	10.6	$1,732,698	0.5%	$163,461	0.1%	$159,805	0.9%
Building Envelope Improvements	92	0.4%	356,853	0.3%	3,568,527	0.2%	10.0	2.9	$952,307	0.3%	$329,324	0.2%	$58,946	0.3%
High Efficiency Air Conditioning	41	0.2%	127,702	0.1%	2,554,036	0.2%	20.0	11.5	$635,422	0.2%	$55,200	0.0%	$34,500	0.2%
Business Design, Audits & Commissioning	8	0.0%	109,429	0.1%	1,641,435	0.1%	15.0	0.0	$289,778	0.1%	$31,107,938	22.9%	$36,881	0.2%
Commercial Industrial Processes	0	0.0%	31,388	0.0%	156,939	0.0%	5.0	1.7	$26,083	0.0%	$14,994	0.0%	$7,820	0.0%
Accounting	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$152,948	0.1%	$1,149,698	6.2%
Energy Study	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$5,000	0.0%	$5,000	0.0%
Total	**20,473**	**100.0%**	**123,583,370**	**100.0%**	**1,653,067,787**	**100.0%**	**13.4**	**2.4**	**$333,347,497**	**100.0%**	**$136,067,145**	**100.0%**	**$18,667,919**	**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

PY2018 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	Oahu	6,447,526,776	75.1%	60,268,965	76.4%	0.9%	30,758,775	68.9%	0.5%	91,027,740	73.7%	1.4%
Hawaii	Hawaii Island	1,043,657,714	12.2%	9,758,541	12.4%	0.9%	7,469,948	16.7%	0.7%	17,228,489	13.9%	1.7%
Maui	Maui	1,033,724,167	12.0%	8,853,630	11.2%	0.9%	5,786,972	13.0%	0.6%	14,640,602	11.8%	1.4%
Maui	Lanai	29,906,898	0.3%	6,898	0.0%	0.0%	366,386	0.8%	1.2%	373,284	0.3%	1.2%
Maui	Molokai	29,085,398	0.3%	39,065	0.0%	0.1%	274,190	0.6%	0.9%	313,255	0.3%	1.1%
Total			**8,583,900,953**	**100.0%**	**78,927,099**	**100.0%**	**0.9%**	**44,656,271**	**100.0%**	**0.5%**	**123,583,370**	**100.0%**

PY2018 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	Oahu	6,447,526,776	75.1%	70,409,458	76.6%	1.1%	37,308,936	68.3%	0.6%	107,718,394	73.5%	1.7%
Hawaii	Hawaii Island	1,043,657,714	12.2%	11,229,166	12.2%	1.1%	9,351,331	17.1%	0.9%	20,580,498	14.0%	2.0%
Maui	Maui	1,033,724,167	12.0%	10,270,607	11.2%	1.0%	7,332,616	13.4%	0.7%	17,603,222	12.0%	1.7%
Maui	Lanai	29,906,898	0.3%	8,365	0.0%	0.0%	340,867	0.6%	1.1%	349,232	0.2%	1.2%
Maui	Molokai	29,085,398	0.3%	47,368	0.1%	0.2%	269,881	0.5%	0.9%	317,249	0.2%	1.1%
Total			**8,583,900,953**	**100.0%**	**91,964,964**	**100.0%**	**1.1%**	**54,603,632**	**100.0%**	**0.6%**	**146,568,596**	**100.0%**

* 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 39.2%. The rate schedule receiving the second highest amount of incentives is "J" with 21.2%. 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 18.7%. Schedule "P" customers are Large Power Service users with demand greater than 300 kW per month.

The distribution of incentives between island for PY18 is: 70.7% of incentive funds on Oʻahu (down from 73.4%), 16.9% on Hawaiʻi Island (up from 12.7%), 10.9% on Maui (down from 12.7%), 0.8% on Lānaʻi (up from < 0.03%), and 0.8% on Molokaʻi (down from 1.2%).

Table 25 **Island Equity Incentives by Rate Schedule**									
Island	**R**	**G**	**J**	**P**	**DS**	**F**	**Other***	**Total**	**%**
Oʻahu	$4,878,479	$755,599	$2,678,543	$2,561,075	$1,280,169	$1,038,569	$0	$13,192,435	70.7%
Hawaiʻi Island	$1,278,394	$572,864	$856,352	$438,081	$0	$0	$0	$3,145,691	16.9%
Maui	$894,437	$225,291	$420,975	$490,438	$0	$0	$0	$2,031,141	10.9%
Lānaʻi	$151,187	$444	$215	$0	$0	$0	$0	$151,846	0.8%
Molokaʻi	$121,861	$13,221	$11,725	$0	$0	$0	$0	$146,807	0.8%
Total	**$7,324,358**	**$1,567,418**	**$3,967,810**	**$3,489,594**	**$1,280,169**	**$1,038,569**	**$0**	**$18,667,919**	**100.0%**
Percent	**39.2%**	**8.4%**	**21.3%**	**18.7%**	**6.9%**	**5.6%**	**0.0%**	**100.0%**	

*"Other" combines the less frequently assigned rate codes for PY18

Table 26 shows Island Equity by program category. In total, energy savings was distributed by county as follows: 73.7% in Honolulu, 13.9% in Hawaiʻi and 12.4% in Maui counties.

Table 26 **Island Equity Energy Savings by Program Budget Category**							
Program	**Oahu**	**Hawaiʻi Island**	**Maui**	**Molokaʻi**	**Lānaʻi**	**Total**	**%**
BEEM	27,493,201	5,519,533	6,206,102	39,065	6,898	39,264,799	31.8%
CBEEM	26,303,528	1,795,165	1,067,123	0	0	29,165,816	23.6%
BESM	199,270	438,010	0	0	0	637,280	0.5%
BHTR	6,272,965	2,005,834	1,580,405	0	0	9,859,204	8.0%
Business Programs	**60,268,965**	**9,758,541**	**8,853,630**	**39,065**	**6,898**	**78,927,099**	**63.9%**
REEM	28,157,768	6,774,595	5,448,597	71,114	91,601	40,543,675	32.8%
CREEM	162,877	0	0	0	0	162,877	0.1%
RESM	1,950,869	94,677	72,331	1,839	0	2,119,716	1.7%
RHTR	487,261	600,675	266,044	201,238	274,785	1,830,003	1.5%
Residential Programs	**30,758,775**	**7,469,948**	**5,786,972**	**274,190**	**366,386**	**44,656,271**	**36.1%**
Total	**91,027,740**	**17,228,489**	**14,640,602**	**313,255**	**373,284**	**123,583,370**	**100.0%**
%	**73.7%**	**13.9%**	**11.8%**	**0.3%**	**0.3%**	**100.0%**	

Table 27 shows Island Equity by incentive dollars spent. The amount of incentives disbursed to each county in PY18 is as follows: 70.7% in Honolulu, 16.9% in Hawaiʻi and 12.4% in Maui counties.

Table 27
Island Equity Incentives by Program Budget Category

Program	Oahu	Hawaiʻi Island	Maui	Molokaʻi	Lānaʻi	Total	%
BEEM	$2,527,964	$730,820	$531,712	$24,434	$365	$3,815,295	20.4%
CBEEM	$4,138,160	$312,277	$181,258	$0	$0	$4,631,695	24.8%
BESM	$59,221	$145,681	$8,534	$0	$0	$213,436	1.1%
BHTR	$1,540,370	$677,120	$414,776	$0	$0	$2,632,266	14.1%
Business Programs	**$8,265,716**	**$1,865,897**	**$1,136,281**	**$24,434**	**$365**	**$11,292,693**	**60.5%**
REEM	$4,034,902	$975,710	$750,897	$15,086	$6,414	$5,783,009	31.0%
CREEM	$85,550	$0	$0	$0	$0	$85,550	0.5%
RESM	$608,925	$36,250	$26,775	$700	$0	$672,650	3.6%
RHTR	$197,341	$267,834	$117,188	$106,587	$145,067	$834,017	4.5%
Residential Programs	**$4,926,718**	**$1,279,794**	**$894,860**	**$122,373**	**$151,481**	**$7,375,226**	**39.5%**
Total	**$13,192,435**	**$3,145,691**	**$2,031,141**	**$146,807**	**$151,846**	**$18,667,919**	**100.0%**
%	**70.7%**	**16.9%**	**10.9%**	**0.8%**	**0.8%**	**100.0%**	

BUSINESS PROGRAM

Overall Impacts

For PY18, Hawai'i Energy's Business program achieved first-year savings of 78,927,099 kWh, lifetime savings of 1,199,361,878 kWh and demand savings of 10,946 kW with $11,292,693 in incentives. In relative terms, 60.5% of Hawai'i Energy's incentives ($11,292,693 out of $18,667,919 of direct incentives) captured 63.9% of first-year kWh, 72.6% of lifetime kWh and 53.5% of kW demand first-year savings, respectively, with a Total Resource Benefit-to-Cost ratio of 2.9.

Table 28

Business Program Impacts Summary provides a detailed breakdown by budget category. For PY18, 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	277,195	5,571	50.9%	39,264,799	49.7%	622,008,663	51.9%	15.8	4.5	$126,418,957	53.6%	$27,920,124	34.2%	$3,815,295	33.8%
CBEEM	351	4,092	37.4%	29,165,816	37.0%	434,180,694	36.2%	14.9	4.1	$80,566,061	34.2%	$19,446,984	23.9%	$4,631,695	41.0%
BESM	271	48	0.4%	637,280	0.8%	5,795,603	0.5%	9.1	0.0	$1,056,087	0.4%	$31,216,611	38.3%	$213,436	1.9%
BHTR	52,980	1,235	11.3%	9,859,204	12.5%	137,376,918	11.5%	13.9	9.4	$27,739,147	11.8%	$2,936,422	3.6%	$2,632,266	23.3%
Total	**330,797**	**10,946**	**100.0%**	**78,927,099**	**100.0%**	**1,199,361,878**	**100.0%**	**15.2**	**2.9**	**$235,780,253**	**100.0%**	**$81,520,141**	**100.0%**	**$11,292,693**	**100.0%**

Highlights

In PY18, the Business programs utilized a multi-pronged approach in day-to-day operations based upon a channel, sector, and end-use technology paradigm. The PY18 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 effective and productive collaboration with customers, manufacturers, distributors, facility management firms, consultants and contractors.

Energy Advantage

The Energy Advantage Program continued to be an important element of the overall business portfolio, and specifically, of the Hard-to-Reach efforts. In PY18, 760 small businesses and restaurants had their lamps retrofitted in the Energy Advantage Program. This will result in customers saving 118,183,264 kWh over the life of the lighting system. Hawai'i Energy rebated $2,458,059 of retrofit costs for the Energy Advantage participants, an investment that will generate over $33.7 million in lifetime cost-savings for these businesses. During the second half of the PY18 year, the Energy Advantage Program saw a lag in project submittals and forecasting in comparison to previous years. Factors such as lower Program incentive amounts leading to higher customer upfront costs, a decreasing customer base as energy efficiency projects are completed, and contractors' other competing jobs were all considered in contributing to

the slower project pace. To address these concerns and encourage contractor activity, a limited-time 15% contractor bonus was applied to all Energy Advantage small business and restaurant projects submitted on March 1, 2019 through June 30, 2019. As a result, a large uptick in projects were completed, and the Program was able to surpass its PY18 goals.

Midstream Program

The *Lighting Distributor Instant Rebate Program*, which provides point-of-purchase discounts on commercial lighting products, continued to flourish in PY18. By the end of PY18, 24 lighting distributors were actively participating and advanced $709,016 in Hawaiʻi Energy incentives for energy-efficient lighting products, generating 11,324,592 kWh in program-level energy savings and 823 kW in program-level demand savings. The offer has stabilized in growth and continues to be one of Hawaiʻi Energy's most successful and cost-effective programs.

Domestic Water Pump (Booster Pump) Limited-Time Offer

Historically, domestic water pump systems (more commonly known as booster pumps) have been a low-volume and difficult energy efficiency measure to push in the consumer market. In PY18, Hawaiʻi Energy solicited feedback from a high-performing booster pump Clean Energy Ally and designed a limited-time offer for booster pumps, in which an additional $2,000/project was applied to the customer incentive. The limited-time offer was available for projects that were proposed and committed to between March 1, 2019 and June 30, 2019. An email blast was sent to all CEAs announcing the offer.

In PY18, a total of 16 booster pump projects were completed, in comparison to 10 projects in PY17. Notably, 10 of the 16 projects in PY18 had the increased incentive applied. In addition, the high-performing CEA has another 10 committed projects and is waiting for materials to arrive to complete installation in PY19.

> *"…we were able to sell many more systems with the increased rebate. It is my opinion that the increased rebate was a key factor in making these sales. This has been a huge motivator for people that have not been willing in the past to discuss a new booster pump system. Thank you for offering this opportunity to us!"*
>
> ***– participating Clean Energy Ally***

In conjunction with the increased offer, the Program utilized its partnership with industry-specific magazines *Building Management Hawaiʻi* and *Building Industry,* to publish "Ask the Expert"-style articles on topics including booster pumps and building transformers. Positioning Hawaiʻi Energy Advisors as technical experts helps add credibility to Program offerings and the printed articles can also be used as "leave behind" materials for customers looking to learn more.

EXPERTS | SOLAR

Boosting Low Water Pressure in Your Facility

New incentives are available for a system upgrade

Rachel Fukumoto

The top floors of condos and apartments in Hawaii tend to have amazing views of our Island paradise. But as you might imagine, one of the tradeoffs can be poor water pressure for people who live there.

We've all heard the awful stories: Folks not being able to take a shower when the washing machine is running,

Article on Booster Pumps in the June issue of Building Management Hawaiʻi *magazine. These magazines reach approximately 43,900 building/property managers, contractors, and construction industry professionals each month, many of whom could be (or are already) installing and promoting energy-saving measures.*

Innovation Symposium

Hawai'i Energy hosted its second Innovation Symposium, its largest outward-facing event, providing a platform for facility managers to receive valuable training and for contractors to gain exposure to potential projects.

More than 200 facilities management professionals, energy industry representatives, and Clean Energy Ally exhibitors attended this year's event. Feedback from the inaugural conference played a critical role in shaping the variety of content, attendees and activities. This year included new features, such as: an industry-specific session (to encourage hotel/hospitality sector attendance); a focus on increasing high school and college student attendance and engagement; and a post-conference networking mixer. The Program secured more than $35,000 in corporate sponsorships to help offset administrative costs, something the Program looks to increase in the future in order to stretch its ratepayer funding further.

The Program also hosted its first awards program, recognizing the most outstanding energy efficiency projects completed in the last year. Awards were designed to acknowledge the winning companies for integrating energy savings into their operations and for setting an example for others in their industry. The awards covered four categories, explained below with the names of the winners:

- *Best in Industry* – recognized the best in a particular pre-determined industry; this year, the Program highlighted the Healthcare industry.

  Winner: Queen's Medical Center

- *Innovation Award* – recognized an innovative energy efficiency project, service, tool or technology that resulted in substantial energy savings and has the potential to have widespread adoption within Hawai'i or the respective industry.

  Winner: Schofield Barracks Wastewater Plant, project performed by Aqua Engineers

- *Energy Efficiency Hero* – recognized an individual whose leadership and contributions have made a significantly positive impact on Hawai'i's energy efficiency industry and community.

  Winner: Lloyd Leong, Director of Engineering at Mauna Kea Resort

- *Clean Energy Ally of the Year* – recognized the CEA that went above and beyond to deliver outstanding services to customers and is an active participant in our program.
  Winner: Hawai'i Energy Systems

Nominees for these awards were nominated by their peers and Hawai'i Energy staff members.

Hawai'i Energy integrated several new features to the 2018 Symposium, including offering high school and college students the chance to attend the event for free. Students from O'ahu and Hawai'i Island had the opportunity to engage with business professionals and attend the sessions on various energy topics (second photo down). Another new feature was award presentations for the best energy efficiency projects of the year. Award winners were recognized on stage by Hawai'i Energy Executive Director, Brian Kealoha (left) and representatives from the award sponsors, ENGIE and Ameresco (right).

Overall Expenditures

Given its constrained budget for PY18, 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) program had only limited activity in PY18. See **Table 29** for the detailed expenditures.

Table 29
Business Program Expenditures

	Total Expenditures	PY18 Budget (R7)	Percent Spent	Unspent	Percent Unspent
Business Programs					
Operations and Management					
BEEM	$889,243.39	$889,460.33	99.98%	$216.94	0.02%
CBEEM	$599,319.30	$738,538.87	81.15%	$139,219.57	18.85%
BESM	$26,079.53	$63,088.97	41.34%	$37,009.44	58.66%
BHTR	$446,179.33	$450,294.08	99.09%	$4,114.75	0.91%
Total Business Programs	$1,960,821.55	$2,141,382.25	91.57%	$180,560.70	8.43%
Business Evaluation	$378,307.17	$419,168.93	90.25%	$40,861.76	9.75%
Business Outreach	$392,408.76	$412,484.56	95.13%	$20,075.80	4.87%
Total Business Non-Incentives	**$2,731,537.48**	**$2,973,035.74**	**91.88%**	**$241,498.26**	**8.12%**
Business Incentives					
BEEM	$3,815,295.14	$3,817,385.44	99.95%	$2,090.30	0.05%
CBEEM	$4,631,695.33	$4,635,920.67	99.91%	$4,225.34	0.09%
BESM	$213,436.27	$217,033.00	98.34%	$3,596.73	1.66%
BHTR	$2,632,266.05	$2,633,654.61	99.95%	$1,388.56	0.05%
Subtotal Business Incentives	$11,292,692.79	$11,303,993.72	99.90%	$11,300.93	0.10%
Business Transformational	$967,660.88	$1,156,283.49	83.69%	$188,622.61	16.31%
Total Business Incentives	**$12,260,353.67**	**$12,460,277.21**	**98.40%**	**$199,923.54**	**1.60%**
Total Business Programs	**$14,991,891.15**	**$15,433,312.95**	**97.14%**	**$441,421.80**	**2.86%**

Business Program Clean Energy Allies

Background

Business trade allies are the product manufacturers, wholesale and retail suppliers, equipment contractors, architects, engineers and electricians on the front-lines, directly responsible for energy efficiency measures being sold, designed, financed, installed, commissioned and maintained. Hawai'i Energy recognizes that regular engagement with Allies is offers greater opportunities to transform the market, and has been successful in uncovering opportunities to collaborate and support trade allies who in turn leverage resources to promote energy conservation and efficiency.

Through orientation training and ongoing involvement with the Clean Energy Ally program, business trade allies are well-versed in our incentive offerings and engaged in training and networking events throughout the year. As shown in **Table 30**, approximately 76% of Customer Lifetime Savings achieved in PY18 were brought to the Program through these allies. Over the years, we have taken a more strategic approach with these allies, including creating the Energy Insiders Rewards program to incentivize and reward the most active allies. For more details, see the *Clean Energy Ally (CEA) Program* in the Transformational Section.

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
Johnson Controls	1,784	13,361,389	242,393,380	17.3%
Koo Electric Service	411	3,353,322	46,894,118	3.3%
Alpha Electric Supply, Inc.	221	2,751,079	41,179,273	2.9%
Hawaii Energy Systems	279	2,403,098	36,920,397	2.6%
Pangilinan Electrical, LLC	329	2,507,571	35,105,990	2.5%
Pioneer Electric	248	2,464,776	32,546,023	2.3%
Nordic PCL Construction	388	1,602,531	28,348,959	2.0%
Ecology Action	283	1,818,039	27,126,257	1.9%
Graybar Electric Co.	127	1,757,177	26,357,649	1.9%
Dial Electric Supply	124	1,752,961	26,294,416	1.9%
Sylvania Lighting Solutions	224	1,527,789	22,808,895	1.6%
Chelsea Group	239	1,497,472	22,462,085	1.6%
AESolutions, LLC	205	1,589,223	21,967,882	1.6%
SLS Energy Solutions	212	1,443,899	21,658,492	1.5%
Hawaii PV Partners	104	1,404,563	20,867,036	1.5%
Insynergy Engineering, Inc.	283	984,893	19,528,777	1.4%
Powersmiths	90	752,557	18,014,386	1.3%
HD Supply Facilities Maintenance	84	1,194,405	17,916,077	1.3%
Energy Management Consulting & Construction, LLC (EMCC)	194	961,610	16,988,893	1.2%
Remaining Allies	3,464	25,693,443	344,963,134	24.6%
Direct customer applications	3,508	21,143,166	331,713,477	23.7%
Total	**12,799**	**91,964,964**	**1,402,055,597**	**100.0%**

Business Energy Efficiency Measures (BEEM)

Objectives

The objective of the BEEM program is to acquire electric energy and demand savings through customer installations of proven energy efficiency technologies by applying prescriptive incentives in a streamlined application process. The BEEM program consisted of several offerings in PY18. 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

Military Properties

The military uses about 16% of the overall electricity load in Hawai'i. Hawai'i Energy worked closely with the Army's performance contractor to complete lighting retrofits for 97 buildings, replace AC and chiller systems, install occupancy based AC controls in the barracks and replace transformers on four military bases. From these projects, the military has received $799,369 in incentives, and will see an annual savings of 6.6 million kWh.

Accomplishments

In PY18, the bulk of savings and dollar impacts came from High-Efficiency Lighting and HVAC. 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 PY18. The end result was a combined contribution of all LED offerings, including directional, omnidirectional, linear tube, specialty LEDs, LED exit signs and LED refrigerated case lighting, achieving energy savings of 24,695,947 kWh this past year, or 62.9% of the total BEEM program energy savings.

High-Efficiency HVAC

In PY18, 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 PY18, Chillers and VFDs installed in HVAC systems produced energy savings of 8,331,456 kWh or 21.3% of the total BEEM program energy savings.

Impacts

For PY18, the BEEM program achieved first-year savings of 39,264,799 kWh and demand savings of 5,571 kW with $3,815,295 in incentives. **Table 31** provides further details.

Table 31
BEEM Program Impacts

Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh Life)		Average Measure Life (Yrs)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			$	%	$	%	$	%
LED Linear	202,598	1,510	27.1%	14,090,846	35.9%	211,362,683	34.0%	15.0	4.0	$40,789,972	32.3%	$10,129,900	36.3%	$1,088,975	28.5%
Chillers	47	1,883	33.8%	7,722,563	19.7%	154,451,252	24.8%	20.0	3.2	$34,180,713	27.0%	$10,620,918	38.0%	$434,201	11.4%
LED Specialty	1,823	389	7.0%	4,242,967	10.8%	63,644,508	10.2%	15.0	11.8	$11,838,482	9.4%	$1,002,650	3.6%	$712,220	18.7%
LED Lighting	22,910	368	6.6%	4,090,073	10.4%	61,351,097	9.9%	15.0	10.8	$11,363,911	9.0%	$1,047,680	3.8%	$135,048	3.5%
Split Systems:	764	563	10.1%	2,518,373	6.4%	37,775,600	6.1%	15.0	29.2	$9,258,231	7.3%	$316,624	1.1%	$450,884	11.8%
LED Omni Directional	33,356	166	3.0%	2,090,385	5.3%	31,355,777	5.0%	15.0	4.8	$5,659,515	4.5%	$1,167,460	4.2%	$70,071	1.8%
Custom - EMS TBD	1,495	124	2.2%	931,623	2.4%	13,974,350	2.2%	15.0	6.4	$2,860,394	2.3%	$448,500	1.6%	$112,125	2.9%
VFD Pump	30	156	2.8%	608,893	1.6%	9,133,393	1.5%	15.0	6.2	$2,373,218	1.9%	$381,650	1.4%	$89,800	2.4%
Split Systems: VRF	220	50	0.9%	412,621	1.1%	6,189,321	1.0%	15.0	2.3	$1,233,551	1.0%	$528,349	1.9%	$179,544	4.7%
Domestic Water Booster Packages	16	37	0.7%	386,667	1.0%	5,800,004	0.9%	15.0	2.5	$1,088,062	0.9%	$437,000	1.6%	$69,680	1.8%
Package Units	37	64	1.2%	287,475	0.7%	4,312,131	0.7%	15.0	3.9	$1,058,291	0.8%	$271,668	1.0%	$50,865	1.3%
Window Film	4,112	92	1.6%	356,853	0.9%	3,568,527	0.6%	10.0	2.9	$952,307	0.8%	$329,324	1.2%	$58,946	1.5%
ECM Fan Coil	1,219	27	0.5%	233,807	0.6%	3,507,110	0.6%	15.0	2.7	$690,480	0.5%	$255,990	0.9%	$67,365	1.8%
Room Occupancy Sensors	6,121	34	0.6%	340,552	0.9%	2,724,419	0.4%	8.0	4.6	$560,786	0.4%	$122,420	0.4%	$122,495	3.2%
Solar Water Heating	2	3	0.1%	121,200	0.3%	2,423,990	0.4%	20.0	26.5	$349,658	0.3%	$13,200	0.0%	$26,381	0.7%
Fluorescent Delamping	1,299	21	0.4%	171,064	0.4%	2,394,897	0.4%	14.0	46.8	$485,972	0.4%	$10,392	0.0%	$6,468	0.2%
LED Exit Signs	28	13	0.2%	120,765	0.3%	1,811,468	0.3%	15.0	18.5	$348,602	0.3%	$18,840	0.1%	$9,566	0.3%
Refrigerator Trade In	154	17	0.3%	105,446	0.3%	1,476,247	0.2%	14.0	1.8	$326,279	0.3%	$184,800	0.7%	$23,100	0.6%
Heat Pump	16	6	0.1%	106,010	0.3%	1,060,098	0.2%	10.0	1.0	$190,483	0.2%	$195,033	0.7%	$8,901	0.2%
ECM Refrigeration	126	5	0.1%	48,568	0.1%	728,513	0.1%	15.0	5.5	$140,702	0.1%	$25,452	0.1%	$10,710	0.3%
Package Units: VRF	14	6	0.1%	45,336	0.1%	680,044	0.1%	15.0	0.9	$141,677	0.1%	$150,305	0.5%	$18,675	0.5%

(cont'd) BEEM Program Impacts																
Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh Life)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			$	%	$	%	$	%
Anti-Sweat Heater Controls	53	4	0.1%	37,931	0.1%	455,167	0.1%	12.0	19.0	$90,463	0.1%	$4,770	0.0%	$5,300	0.1%
VFD - AHU	11	6	0.1%	26,771	0.1%	401,565	0.1%	15.0	4.5	$98,084	0.1%	$21,715	0.1%	$3,425	0.1%
VRFAir Conditioners	22	6	0.1%	22,025	0.1%	330,375	0.1%	15.0	0.7	$88,428	0.1%	$118,961	0.4%	$3,700	0.1%
LED Refrigerated Case Lighting	437	8	0.1%	60,911	0.2%	304,556	0.0%	5.0	0.0	$69,644	0.1%	$0	0.0%	$19,400	0.5%
VFD Pool Pumps	5	1	0.0%	12,173	0.0%	182,594	0.0%	15.0	0.0	$33,178	0.0%	$0	0.0%	$2,925	0.1%
Rid-A-Fridge (Refrigerator)	18	2	0.0%	12,853	0.0%	179,940	0.0%	14.0	30.8	$39,767	0.0%	$1,290	0.0%	$1,290	0.0%
Case Night Cover	48	0	0.0%	31,388	0.1%	156,939	0.0%	5.0	1.7	$26,083	0.0%	$14,994	0.1%	$7,820	0.2%
Submetering (Condo)	138	5	0.1%	19,251	0.0%	154,006	0.0%	8.0	0.6	$43,359	0.0%	$69,000	0.2%	$20,700	0.5%
CEE Tier 1+ Motors	7	2	0.0%	3,777	0.0%	56,653	0.0%	15.0	1.3	$23,499	0.0%	$17,745	0.1%	$825	0.0%
Window AC w/ Trade In	18	1	0.0%	3,317	0.0%	29,854	0.0%	9.0	1.0	$8,409	0.0%	$8,100	0.0%	$900	0.0%
Rid-A-Fridge (Freezer)	1	0	0.0%	716	0.0%	10,027	0.0%	14.0	29.5	$2,216	0.0%	$75	0.0%	$75	0.0%
Smart Thermostats	7	0	0.0%	806	0.0%	8,862	0.0%	11.0	1.0	$1,356	0.0%	$1,400	0.0%	$350	0.0%
Fluorescent T8 to T8 Low Wattage	30	0	0.0%	530	0.0%	7,416	0.0%	14.0	1.0	$1,870	0.0%	$1,800	0.0%	$60	0.0%
Whole House Fan	1	0	0.0%	264	0.0%	5,279	0.0%	20.0	10.9	$1,313	0.0%	$120	0.0%	$75	0.0%
Accounting	12	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$2,000	0.0%	$2,432	0.1%
Total	**277,195**	**5,571**	**100.0%**	**39,264,799**	**100.0%**	**622,008,663**	**100.0%**	**15.8**	**4.5**	**$126,418,957**	**100.0%**	**$27,920,124**	**100.0%**	**$3,815,295**	**100.0%**

Expenditures

The original budget for the BEEM program as presented in the Hawaiʻi Energy PY18 Annual Plan was $4,217,254, split between Operations at $780,000 and Incentives at $3,437,254 (see **Table 15**). Hawaiʻi Energy made several transfers between other program budgets until the final PY18 budget for the BEEM program was $4,704,538.53, as shown in **Appendix B**. By the end of the program year, Hawaiʻi Energy had distributed nearly all BEEM Operation and Incentive budgets due to the popularity and demand for the program's offerings.

Customized Business Energy Efficiency Measures (CBEEM)

Objective

The objective of the CBEEM 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 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 incentivized through the CBEEM program, as the use of certified equipment is a requirement for the 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.

Adjustments from the Annual Plan

In the PY18 Annual Plan, Hawai‘i Energy noted a significant multi-year energy project with substantial energy savings and associated incentive that was expected to be completed in the program year. This project was a replacement of the ultraviolet lighting system at the Sand Island Wastewater Treatment Plant. As with many very complex projects, the timing of this project was delayed on the customer side, and the incentive was not paid in PY18. This project is now planned for completion in PY19. The delayed completion did not adversely affect Program goals as there was sufficient demand in the CBEEM program in PY18 to successfully meet targets.

Impacts

For PY18, the CBEEM program achieved first-year savings of 29,165,816 kWh and 4,092 kW in demand savings with $4,631,695 in incentives.

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	295	3,071	75.1%	20,902,165	71.7%	293,525,043	67.6%	14.0	3.9	$55,988,069	69.5%	$14,400,446	74.0%	$3,450,376	74.5%
Custom	41	483	11.8%	4,592,435	15.7%	85,395,441	19.7%	18.6	6.1	$13,749,656	17.1%	$2,269,529	11.7%	$735,481	15.9%
Custom HVAC	10	538	13.2%	3,671,216	12.6%	55,260,211	12.7%	15.1	3.9	$10,828,336	13.4%	$2,777,008	14.3%	$443,838	9.6%
Accounting	0	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$0	0.0%	$2,000	0.0%
Total	**1,578**	**4,092**	**100.0%**	**29,165,816**	**100.0%**	**434,180,694**	**100.0%**	**14.9**	**4.1**	**$80,566,061**	**100.0%**	**$19,446,984**	**100.0%**	**$4,631,695**	**100.0%**

Expenditures

The original budget for the CBEEM program as presented in the Hawaiʻi Energy PY17 Annual Plan was $5,653,529, split between Operations at $995,000 and Incentives at $4,658,529 (see **Table 15**). Hawaiʻi Energy made several transfers between other program budgets until the final PY18 for the CBEEM program was $5,231,014.63, as shown in **Appendix B**. By the end of the program year, Hawaiʻi Energy distributed nearly all CBEEM Operation and Incentive budgets due to the popularity and demand for the program offerings.

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).

Accomplishments

Continuous Energy Improvement (CEI)

The intent of the CEI program is to achieve energy savings through sustained organizational change (behavior and work processes) in addition to capital improvements and discrete energy-saving projects. 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.

Water and Wastewater Facilities

Hawai'i Energy continued its commitment to the water and wastewater sector in Hawai'i and to assisting in outreach about the energy-water nexus, acknowledging the energy use associated with pumping, distribution and treatment of the water supply. Water and wastewater facilities are 24/7 facilities that have specific technical requirements, high capital costs and a long procurement process. Hawaiʻi Energy continued its successful collaboration with the County of Hawai'i Department of Water Supply (DWS) in PY18 on another phase of their island-wide leak detection system. In PY18, Hawai'i Energy committed to matching 50% in funding for procurement and installation of additional leak detectors in order to maximize the coverage area.

Impacts

For PY18, the BESM program achieved savings of 637,280 kWh (first-year) and 48 kW savings with $213,436 in incentives.

Leak Detection with the Hawaiʻi County Department of Water Supply

Five years after the first deployment of data loggers in Hawaii County, the Program assisted the Dept. of Water Supply with purchasing new loggers to expand its leak detection program. Loggers are used to detect underground leaks, which - if not identified and fixed - can cause water main breaks and require a greater cost to county taxpayers to repair. Proper maintenance of water lines also reduces energy costs, as electricity is needed to treat and distribute water. The photo above shows a logger being deployed by engineers, which resulted in detecting two small holes leaking 6.6 gallons per minute (9,504 gallons per day) that had no surface indication.

Table 33 **BESM 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 ($)**	
		kW	**%**	**kWh**	**%**	**kWh**	**%**	**(Years)**		**$**	**%**	**$**	**%**	**$**	**%**
Chillers	1	20	41.6%	187,696	29.5%	2,815,436	48.6%	15.0	22.5	$542,925	51.4%	$24,173	0.1%	$24,173	11.3%
Retro-Commissioning	3	8	16.0%	109,429	17.2%	1,641,435	28.3%	15.0	0.0	$289,778	27.4%	$31,107,938	99.7%	$36,881	17.3%
Custom	1	0	0.0%	249,644	39.2%	1,248,220	21.5%	5.0	0.0	$207,454	19.6%	$0	0.0%	$121,258	56.8%
Commercial A/C	224	17	35.8%	76,512	12.0%	76,512	1.3%	1.0	0.2	$13,466	1.3%	$67,200	0.2%	$22,425	10.5%
Residential A/C	41	3	6.6%	13,999	2.2%	13,999	0.2%	1.0	0.2	$2,464	0.2%	$12,300	0.0%	$3,700	1.7%
Energy Audit	1	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$5,000	0.0%	$5,000	2.3%
Total	**271**	**48**	**100.0%**	**637,280**	**1. 100.0%**	**5,795,603**	**100.0%**	**9.1**	**0.0**	**$1,056,087**	**100.0%**	**$31,216,611**	**100.0%**	**$213,436**	**100.0%**

Expenditures

The original budget for the BESM program as presented in the Hawaiʻi Energy PY18 Annual Plan was $309,883, split between Operations at $95,000 and Incentives at $214,883 (see **Table 15**). Hawaiʻi Energy made several transfers between other program budgets until the final PY18 for the BESM program was $280,121.97 as shown in **Appendix B**. By the end of the program year, Hawaiʻi Energy spent $239,515.80 of the budget, primarily on the leak detection measure on Hawaiʻi Island

Business Hard-To-Reach (BHTR)

Objective

The objective of the BHTR program is to help targeted geographic areas and demographic groups that have been traditionally underserved, such as retail, restaurants, other small businesses, and commercially metered multi-family properties[6]. 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
  - Commercial Kitchen Equipment
  - Kitchen Demand-Controlled Ventilation
  - Special Initiatives
- Traditional Retail
  - Commercial Kitchen Equipment
- Program Direct Install
  - Commercially Metered Multi-Family Direct Install (*Energy Smart 4 Homes*)
  - Energy Advantage (formerly Small Business Direct Install Lighting (SBDIL))
  - EmPOWER Hawaiʻi Project

Accomplishments

In PY18, the bulk of savings and dollar impacts came from the Energy Advantage program. In addition, the Program launched the nonprofit- focused EmPOWER Hawaiʻi Project, which will be addressed in greater depth below.

Energy Advantage Program

The Energy Advantage program continued to successfully deliver energy and bill savings to customers in PY18. 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 in Hawaiʻi, Honolulu and Maui counties at little to no cost to the customer. Trade allies recruit eligible participants, perform audits and execute full retrofits.

In PY18, the Energy Advantage program expanded its reach to include multi-family Hard-to-Reach (HTR) properties that are listed on the State of Hawaiʻi's Affordable Housing Inventory. Hawaiʻi Energy has seen this sector face similar barriers to participation in traditional energy efficiency programs as described above and,

A&B Sugar Museum

The Alexander and Baldwin Sugar Museum resides in Pū'unene, Maui, directly across from the now shuttered HC&S Pū'unene Sugar Mill. The museum helps to preserve the legacy of the sugar plantation history in Maui with memorabilia, photographs and displays. The older and inefficient lighting was retrofitted to new LED lighting technology through our Energy Advantage Program and this helped to reduce their energy consumption by over 11,000kWh/year resulting in savings of over $3000 per year. Hawaiʻi Energy helped offset the cost of this retrofit by helping to provide over $3500 in cost share assistance.

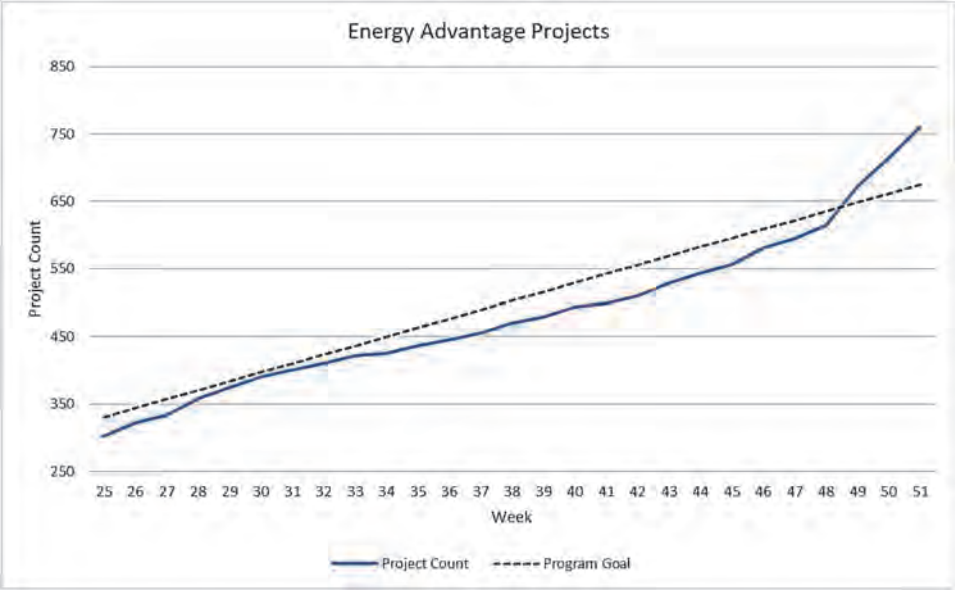
[6] *For more information on Energy Smart 4 Homes, see complete description in the Residential Hard-to-Reach (RHTR) section of this report.*

as a result, it was included in PY18 as eligible to participate in the Energy Advantage program. Many of the listed properties were previous participants of the Residential portfolio's *Energy Smart 4 Homes (ES4H)* program and took a whole-building approach inclusive of common area lighting. The incentive rate was tiered at $0.20/kWh, which offered $0.08/kWh above the Business portfolio's custom incentive rate while maintaining overall cost-effectiveness for the BHTR program. Forty multi-family accounts participated in this pilot offering which resulted in a total of $439,002 in paid incentives with first-year energy and demand savings of 2,272,113 kWh and 277 kW, respectively.

Contractor Bonus

During the second half of the PY18 year, the Energy Advantage program saw a lag in project completions in comparison to the forecasted goal. Factors such as lower incentive amounts leading to customer upfront costs, a decreasing customer base as energy efficiency projects are completed, and other contractor jobs were all considered in contributing to the slower project pace. To address these concerns and encourage contractor activity, a limited-time 15% contractor bonus was applied to all Energy Advantage small business and restaurant projects submitted on March 1, 2019 through June 30, 2019. As a result, a large uptick in projects were completed, and the Program was able to surpass its PY18 goals.

The direct installation approach for the Energy Advantage program achieved total customer level energy and demand savings of 118,183,264 kWh lifetime energy and 1,004 kW in PY18. At an average utility rate of $0.291 per kWh, this is a $33,719,294 in lifetime energy cost reduction for participants.



Project submittals drastically increased after the announcement of the 15% contractor bonus. There was a reasonable delay in project submittals after the announcement due to time required for project completion to submitting for payment (recorded by Week).

Hawai‘i Island Rapid Response Plan

Energy Advantage was a critical piece of the Rapid Response portfolio of offerings, with more than half of the projects generated through this offer. The team was successful in rapidly enhancing the custom contractor tool, AMPLIFY, with new documents and processes to implement the increased incentive levels. These included new applications, project estimates, commitment letters and invoice layouts. The online tool was also quickly, yet accurately, re-configured to calculate Rapid Response incentive rates to create a seamless experience for Energy Advantage Trade Allies.

As a result, Energy Advantage Trade Allies across the state deployed to Hawai‘i Island to execute Rapid Response Plan projects. With elevated incentive levels, many Trade Allies were able to offer lighting retrofits at no cost and even complete projects for customers that were unable or unwilling to participate in the past. The Rapid Response Plan for the Energy Advantage program achieved 196 projects, 1.8 million kWh and over 200 kW savings in PY18. This was a 73%, 43% and 18% respective increase of projects, kWh and kW savings in comparison to PY17 metrics for Hawai‘i Island.

EmPOWER Hawai‘i Project

Nonprofits play a vital role in addressing needs across many market sectors in Hawai‘i but often operate with limited budgets and struggle under high operating costs that affect their ability to provide high-quality services. In PY18, Hawai‘i Energy rolled out the EmPOWER Hawai‘i Project (EmPOWER), which focused on addressing particular barriers to participation in energy efficiency projects, such as lack of capital, lack of on-site knowledge and expertise on energy, and unfamiliarity with contractor sourcing. As a result, EmPOWER was developed to provide elevated incentives to reduce upfront costs of energy efficiency projects, free training sessions throughout the year, and provide direct connections to the Clean Energy Ally network.

The five organizations participating in the project’s first cohort received heavily discounted lighting retrofits and are moving forward, empowered to implement further efficiency projects. Hawai‘i Energy created a web page, social media content, email blasts, and case study videos and publicized the project on local television to garner interest and encourage other organizations to apply. The Program also featured YWCA O‘ahu, a member of the inaugural cohort, on a segment for *Living808* on KHON2, which allowed them to share their mission and educate the community on how this project is making an impact by allowing them to use financial resources that would have been allocated toward utility bills in their core programs instead.

Results

As the program progressed, the training sessions and designated Hawai‘i Energy Advisor, who contributed significant levels of guidance and technical assistance, were instrumental in moving projects along within the group. Although the first cohort was limited to pursuing relatively simple lighting retrofit projects, the barriers identified proved that additional collaboration and support from the Program was needed.

A few unanticipated events occurred, such as an influx of contractor visit requests, delays in board project approvals and equipment delivery interruptions due to newly enacted tariffs. Furthermore, several cohort members opted to expand their scopes based on contractor recommendations. The Program did not anticipate this, but did support with additional funding at an increased level provided the selected products qualified under our program standards. Though this extended the installation periods, this collaboration gave the participants the chance to negotiate internally for more budget and upgrade more of their facilities.

The five organizations above were the participants in the EmPOWER Hawai‘i Project.

Three retrofits were completed by the end of PY18, and the Program awarded a total of $36,313 and achieved first-year savings of 120,720 kWh and demand savings of 12 kW. Due to varying completion dates, some rebates were paid out of and attributed to the PY18 budget, while those that did not complete their projects until PY19 received later payments. All participants came in at or below their original budget.

Next Steps

Hawaiʻi Energy is committed to continuing this program in future years. There are many opportunities to scale this offer in terms of the number of participants, incentivized measures, and extended participant engagement. In addition, the success of the current EmPOWER cohort can be attributed to their new "energy champions" that have advocated for continuation of projects, educational trainings for their staff and marketing opportunities. This included additional energy efficient upgrades (e.g., HVAC and commercial kitchen equipment), Energy Unplugged workshops, and participating with Hawaiʻi Energy in several marketing projects to continue sharing about their important work. Recruitment of the next EmPOWER cohort is targeted to commence in October 2019 and will integrate collected participant and contractor feedback.

As part of their training, participants tour each other's facilities in addition to applying what they learn in a real-life energy project (lighting retrofit) at their facility assisted by Hawaiʻi Energy staff.

Impacts

For PY18, the overall BHTR program achieved savings of 137,376,918 lifetime kWh and 1,235 kW savings with $2,632,266 in incentives. **Table 35** provides the detailed measures contributing to this program.

Table 34
BHTR Program Impacts

Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh Life)		Average Measure Life (Yrs)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			$	%	$	%	$	%
LED Linear	34,341	511	41.3%	4,663,122	47.3%	65,283,703	47.5%	14.0	7.5	$12,827,593	46.2%	$1,717,050	58.5%	$1,246,035	47.3%
Custom - High Efficiency Lighting	5,036	236	19.1%	2,017,259	20.5%	28,241,630	20.6%	14.0	10.6	$5,636,063	20.3%	$532,223	18.1%	$532,223	20.2%
LED Omni Directional	3,918	132	10.7%	903,575	9.2%	12,650,052	9.2%	14.0	19.7	$2,698,088	9.7%	$137,130	4.7%	$219,948	8.4%
LED Specialty	1,602	100	8.1%	766,460	7.8%	10,730,444	7.8%	14.0	30.0	$2,210,174	8.0%	$73,726	2.5%	$197,420	7.5%
LED Lighting	4,949	94	7.6%	678,334	6.9%	9,540,895	6.9%	14.1	11.6	$1,993,286	7.2%	$171,896	5.9%	$205,418	7.8%
Kitchen Ventilation	17	51	4.1%	297,708	3.0%	4,465,623	3.3%	15.0	5.4	$990,618	3.6%	$184,500	6.3%	$72,450	2.8%
Custom Lighting	5	11	0.9%	120,490	1.2%	1,813,298	1.3%	15.0	36.8	$298,320	1.1%	$8,108	0.3%	$30,654	1.2%
LED Refrigerated Case Lighting	136	18	1.4%	127,788	1.3%	1,789,037	1.3%	14.0	0.0	$374,805	1.4%	$0	0.0%	$35,436	1.3%
LED Exit Signs	278	14	1.2%	125,183	1.3%	1,752,561	1.3%	14.0	41.7	$347,796	1.3%	$8,340	0.3%	$28,528	1.1%
Steam Cooker	2	8	0.7%	35,850	0.4%	430,205	0.3%	12.0	7.3	$109,759	0.4%	$15,000	0.5%	$1,500	0.1%
Showerhead	355	41	3.3%	65,902	0.7%	329,510	0.2%	5.0	11.6	$150,026	0.5%	$12,954	0.4%	$12,954	0.5%
Faucet Aerator	472	15	1.2%	25,669	0.3%	128,343	0.1%	5.0	7.3	$55,890	0.2%	$7,675	0.3%	$7,675	0.3%
Advance Power Strips	333	3	0.2%	22,964	0.2%	114,819	0.1%	5.0	2.4	$25,039	0.1%	$10,319	0.4%	$10,319	0.4%
Reach-In Refrigerator Solid Door	8	0	0.0%	4,035	0.0%	48,422	0.0%	12.0	0.4	$9,836	0.0%	$26,000	0.9%	$2,150	0.1%
Ice Machine	2	0	0.0%	2,458	0.0%	29,502	0.0%	12.0	1.2	$5,995	0.0%	$5,000	0.2%	$200	0.0%
Reach-In Freezer Solid Door	2	0	0.0%	2,406	0.0%	28,875	0.0%	12.0	0.9	$5,858	0.0%	$6,500	0.2%	$375	0.0%
Accounting	1,524	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$20,002	0.7%	$28,982	1.1%
Total	**52,980**	**1,235**	**100.0%**	**9,859,204**	**100.0%**	**137,376,918**	**100.0%**	**13.9**	**9.4**	**$27,739,147**	**100.0%**	**$2,936,422**	**100.0%**	**$2,632,266**	**100.0%**

Expenditures

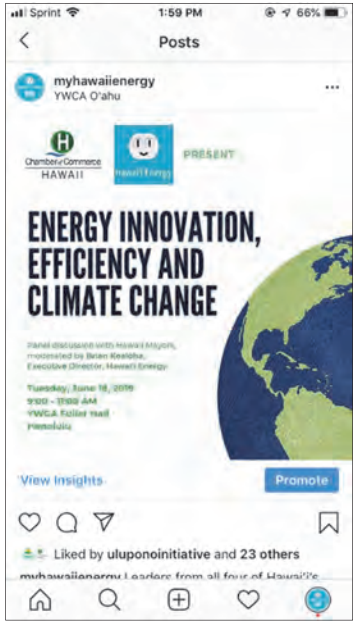
The original budget for the BHTR program as presented in the Hawai‘i Energy PY18 Annual Plan was $3,427,669, split between Operations at $440,000 and Incentives at $2,987,699 (see **Table 15**). Hawai‘i Energy made several transfers between other program budgets until the final PY18 for the BESM program was $280,121.97 as shown in **Appendix B**. By the end of the program year, Hawai‘i Energy spent $3,083,948.69 of the budget.

Additional Outreach

Customer Education

The Program also invested in a number of education and outreach projects targeted specifically at the local business community to raise general awareness of Hawai‘i Energy’s offerings and contributions to the community. One example of this was working with the Chamber of Commerce Hawai‘i for the second year to bring education on energy and climate change to more than 70 local business professionals through a panel discussion in June. Three mayors and a county representative from Hawai‘i island shared their energy and resiliency goals and how they are addressing the unique challenges in their communities.

Sponsoring these events helps to elevate Hawai‘i Energy’s profile as an important contributor to achieving our state’s sustainability goals and creates opportunities for Program staff to engage with local policymakers.



Hawai‘i Energy teamed up with the Chamber of Commerce Hawai‘i to deliver a panel discussion on “Energy Innovation, Efficiency and Climate Change” with distinguished panelists Honolulu Mayor Kirk Caldwell, Maui Mayor Michael Victorino, Kaua‘i Mayor Derek Kawakami and Hawai‘ i County Deputy Director of Research and Development Ron Whitmore. Hawai‘ i Energy’s Executive Director moderated the discussion in which panelists shared their respective counties’ strategic goals and actions.

The Program also launched a customer education campaign on electrical power distribution transformers to bolster its time-limited increased incentive offering. This launch included informational content on the Hawai‘i Energy website, engagement with transformer vendors including a co-op event with a transformer CEA, and an article in Hawaiian Electric Company's monthly *SmartBusiness Central* e-newsletter.

RESIDENTIAL PROGRAM

Overall Impacts

Impacts

With significant changes to the Residential programs going into Program Year 2018, it proved to be another successful year for Hawai'i Energy at 96% of goal met for first-year kWh. The programs achieved 44,656,271 first-year kWh, 435,705,910 lifetime kWh, and 9,527 kW in demand savings with $7,375,226 in incentives. The Residential programs accounted for 36% of Hawai'i Energy's total first-year energy savings and 47% of the Program's total demand savings with 40% of the Program's incentives.

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

Table 35
Residential Program Impacts Summary

Program	Units	Program Demand (kW)		Program Energy First Year (kWh)		Program Energy Lifetime (kWh)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			$	%	$	%	$	%
REEM	3,688,731	8,564	89.9%	40,543,675	90.8%	430,850,481	95.0%	10.6	1.8	$92,112,305	94.4%	$51,560,286	94.5%	$5,783,009	78.4%
CREEM	21	23	0.2%	162,877	0.4%	771,820	0.2%	4.7	2.1	$180,816	0.2%	$85,550	0.2%	$85,550	1.2%
RESM	6,890	421	4.4%	2,119,716	4.7%	4,207,479	0.9%	2.0	0.4	$855,403	0.9%	$2,067,150	3.8%	$672,650	9.1%
RHTR	40,389	519	5.5%	1,830,003	4.1%	17,876,130	3.9%	9.8	5.3	$4,418,720	4.5%	$834,017	1.5%	$834,017	11.3%
Total	**3,736,031**	**9,527**	**100.0%**	**44,656,271**	**100.0%**	**453,705,910**	**100.0%**	**10.2**	**1.8**	**$97,567,244**	**100.0%**	**$54,547,003**	**100.0%**	**$7,375,226**	**100.0%**

Highlights

The strategies deployed for Hawai'i Energy's Residential programs in PY18 were multi-pronged:

- Enhance and streamline existing offerings responsive to the marketplace, such as the midstream AC contractor program and refreshed Home Energy Reports
- Innovate to create new offerings and quickly respond to varying real-time needs in the community, e.g., the Rapid Response Program
- Mitigate the impact of declining savings attribution from lighting and Home Energy Reports by expanding with new partners such as Costco
- Collaborate with community organizations such as Pūlama Lāna'i to deliver an entire suite of program offerings in a holistic manner.

New measures and innovative new programs were introduced through a focus on customer segmentation, leveraging program and customer data, and tailoring 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.**

Air-Conditioning Focus (Trade Ally)

Building on the popularity of the AC Tune-Up program launched in PY16, the Program reviewed the offering with our participating contractors to determine how to further streamline and improve the program. The PY18 incentive was increased to $100 from $75, giving customers additional motivation to maintain the investment they had already made in air-conditioning equipment, which doubled participation compared to PY17.

The central AC program launched as a pilot design in PY17 with a $1,000 incentive to offset the larger cash outlay required to retrofit an old, inefficient system to a more efficient model. PY18 realized almost forty rebated units, a result of our Allies working with their customer base to take advantage of these savings.

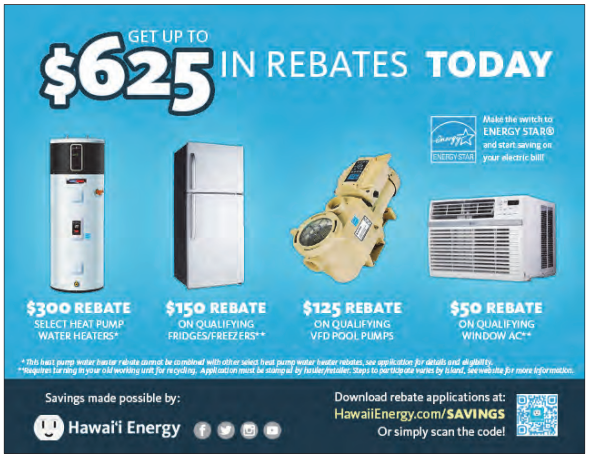
As a complement to the existing mail-in rebates, a new approach was initiated in PY18 to incentivize the purchase, installation and recycling of energy-efficient window air-conditioners. Affordable Home AC (AHAC), a new addition to the Clean Energy Ally (CEA) program, customized an approach to work with local families to remove old window ACs and replace them with high-efficiency window ACs, then team up with local business Refrigerant Recycling to recycle the old window AC units, creating a "one-stop shop" for window AC replacements.

Direct Consumer Purchases

Hawaiʻi 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. By offering incentives to retailers for each ENERGY STAR® qualified appliance or electronic product, Hawaiʻi Energy influenced retailer stocking and displays, and upstream purchase decisions by significantly improving profits and margins on these products. In Hawaiʻi, 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.

The continuing expansion of retail participation for the midstream programs was a success with the notable addition of Costco Wholesale, a win for Hawaiʻi Energy as the first in the country to garner Costco's participation in a midstream program. New measures including freezers, dishwashers, air purifiers and dehumidifiers were added to our existing retailer agreements with Sears, Best Buy, Home Depot and Lowe's, leveraging the addition of air quality measures for the Rapid Response Program.

Simultaneously, Hawaiʻi Energy inserted promotional materials in stores, directing customers to buy the most efficient products. By nudging customers and incentivizing retailers, Hawaiʻi 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.



New point-of-purchase signage was distributed throughout the year as a result of building strong relationships with retailers. Signage messaging was consolidated into a "one retail" message and was timed with retail seasons to ensure placement.

In PY18, the Program saw an increase of ENERGY STAR® television incentive units from 9,000 in PY17 to over 16,000 in PY18. Aligning marketing efforts with retail holidays like Black Friday and the Super Bowl, Hawaiʻi Energy promoted energy efficiency during some of the biggest purchasing periods of the year. Combined with other midstream appliances, these ENERGY STAR® products added up to a savings of over 6,000,000 first-year kWh over baseline models.

Direct Install and Bulk Purchase for Hard-to-Reach

Hawaiʻi 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. This population not only represents low-income or those living below federal poverty levels, but also groups, such as the elderly, homeless, geographically isolated, rural communities, and the financially vulnerable, described by Aloha United Way's ALICE® (Asset-Limited, Income-Constrained, and Employed) report as those that are not making enough income to meet a basic survival budget.

The opportunity to access a resident's home frequently begins with the *Energy Smart 4 Homes* (ES4H) program, which provides multi-family and single-family customers direct installations at no cost to the tenant or landlord. The retrofit services include high-efficiency lighting, water measures and advanced power strips for energy management. In PY18, the ES4H program utilized a channel partner to service properties in both the public and private sectors, including the City and County of Honolulu Department of Land Management, Hawaiʻi County Office of Housing & Community Development (OHCD), State of Hawaiʻi Department of Hawaiian Homelands, local property management companies, and single-owner walk-up properties. The Program reached over 3,800 multi-family and single-family households.

Additionally, custom projects involving bulk appliance purchases necessitated significant program resource support. The Program worked in collaboration with targeted communities and agencies: Pūlama Lānaʻi, the management company for Lānaʻi's largest landowner, and OHCD's Kulaimano Elderly Housing project. Hawaiʻi Energy provided high-efficiency refrigerator replacements to residents who would otherwise be unable to realize these energy savings. The program replaced over 170 refrigerators, working with local suppliers, transport/moving companies, and recycling companies to install, haul away, and properly recycle the old refrigerators.

The combined efforts from the direct installations and bulk appliance purchase programs saved customers over 1,830,000 kWh. For more details on the program's accomplishments in this area, please refer to the "Residential Hard-To-Reach (RHTR)" section, as well as the "Behavior Modification and Community Workshops" section under Transformational Programs in this report.

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

In PY18, Hawaiʻi Energy's Home Energy Report program was refreshed and revamped with a different analytical approach and a new customer look emphasizing positive feedback by grouping and comparing homes with similar characteristics rather than neighbors.. The program distributed personalized Home Energy Reports (HERs) to all eligible customers, providing insight into their electricity consumption and how it compares to that of similar homes. 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, Hawaiʻi 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 reports continue to garner 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, as well as weekly challenges for those customers who subscribed to the online portal. 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 PY18, the Residential program distributed almost 96% of its allocated incentive budget, based on final allocations. The year ended with a total of $7,375,226 in resource acquisition incentives spent, leaving a surplus of $323,464. The bulk of this surplus – over $250,000 – is a result of the Program's successful focus on lowering the overall per-bulb incentive cost for upstream lighting.

This level of incentive distribution reflects Hawai'i Energy's ability to adjust its programs throughout the year in response to program directives and market needs and drivers. Going into the program year and as the year progressed, Hawai'i Energy responded to these market trends by making adjustments to the annual plan by expanding or curtailing initiatives as needed, as evidenced with lighting and the emergency-targeted Rapid Response Program. 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 and 92% of the original goal for lifetime kWh.

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

Table 36
Residential Program Expenditures

	Total Expenditures	PY18 Budget (R7)	Percent Spent	Unspent	Percent Unspent
Operations and Management					
REEM	$1,104,452	$1,104,479	100.00%	$27	0.00%
CREEM	$55,931	$55,945	99.97%	$14	0.03%
RESM	$174,326	$174,382	99.97%	$56	0.03%
RHTR	$259,169	$259,274	99.96%	$105	0.04%
Total Residential Programs	$1,593,877	$1,594,079	99.99%	$202	0.01%
Residential Evaluation	$100,182	$100,230	99.95%	$48	0.05%
Residential Outreach	$486,467	$486,547	99.98%	$80	0.02%
Total Residential Non-Incentives	**$2,180,527**	**$2,180,856**	**99.98%**	**$329**	**0.02%**
Residential Incentives					
REEM	$5,783,009	$6,012,600	96.18%	$229,591	3.82%
CREEM	$85,550	$172,650	49.55%	$87,100	50.45%
RESM	$672,650	$674,763	99.69%	$2,113	0.31%
RHTR	$834,017	$838,677	99.44%	$4,660	0.56%
Subtotal Residential Incentives	$7,375,226	$7,698,690	95.80%	$323,464	4.20%
Residential Transformational	$1,028,706	$1,069,081	96.22%	$40,374	3.78%
Total Residential Incentives	**$8,403,932**	**$8,767,771**	**95.85%**	**$363,838**	**4.15%**
Total Residential Programs	**$10,584,459**	**$10,948,627**	**96.67%**	**$364,168**	**3.33%**

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 that have been replaced. In all, Hawaiʻi Energy was supported by almost 200 unique companies that played a role in driving energy efficiency in the residential market. The Clean Energy Ally (CEA) 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 PY18 came in partnership with CEAs, 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 notable addition of Costco Wholesale, a win for the Hawaiʻi Energy team as the first in the country to garner their participation in a midstream program. New measures including freezers, dishwashers, air purifiers and dehumidifiers were added to Hawaiʻi Energy's existing retailer agreements with Sears, Best Buy, Home Depot and Lowe's, leveraging the addition of the air quality measures for the Rapid Response Program. There are countless other relationships in the supply chain that broaden the reach of the Hawaiʻi Energy programs, including companies such as Refrigerant Recycling (providing proper recycling of old, inefficient appliances) and Servco Home Appliance (assisting with 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 that the importance of energy efficiency is exemplified throughout the product lifecycle.

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

Solar and Heating Ventilation Air-Conditioning (HVAC) contractor-based programs were promoted via direct mail, emails, outreach events, and Home Energy Reports. Messaging in all trade-based promotions placed emphasis on finding a participating contractor. Upgrades were also made to the 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. Frequent email messaging to retailers, distributors and contractors was sent throughout the year, with high open rates at 48%, more than double that of industry standard. Contractors were also again offered cooperative advertising and ways to promote their businesses.

Ongoing Quality Assistance

Hawaiʻi 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 Hawaiʻi residents. As with previous years, Hawaiʻi Energy conducted its annual meeting for participating solar water heating contractors on Oʻahu, Maui, and Hawaiʻi islands. As with previous years, the meetings were consecutively scheduled with AC contractors at the same locations. These half-day sessions provided a forum to update contractors on program results, review all contractor-based offerings in solar water heating and air-conditioning, network, and engage in honest and open dialogue aimed to improve the Program.

This year, the agenda included all the Program's residential offerings, co-presentation and information on the Green Energy Market Securitization (GEMS) loan program for the purchase of select energy-efficient appliances, as well as Hawai'i Solar Energy Association (HSEA). Also garnering interest this year was the introduction and solicitation of contractors to install the Sense monitor for customers (see CREEM section).

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

Table 37
Residential Project Sources

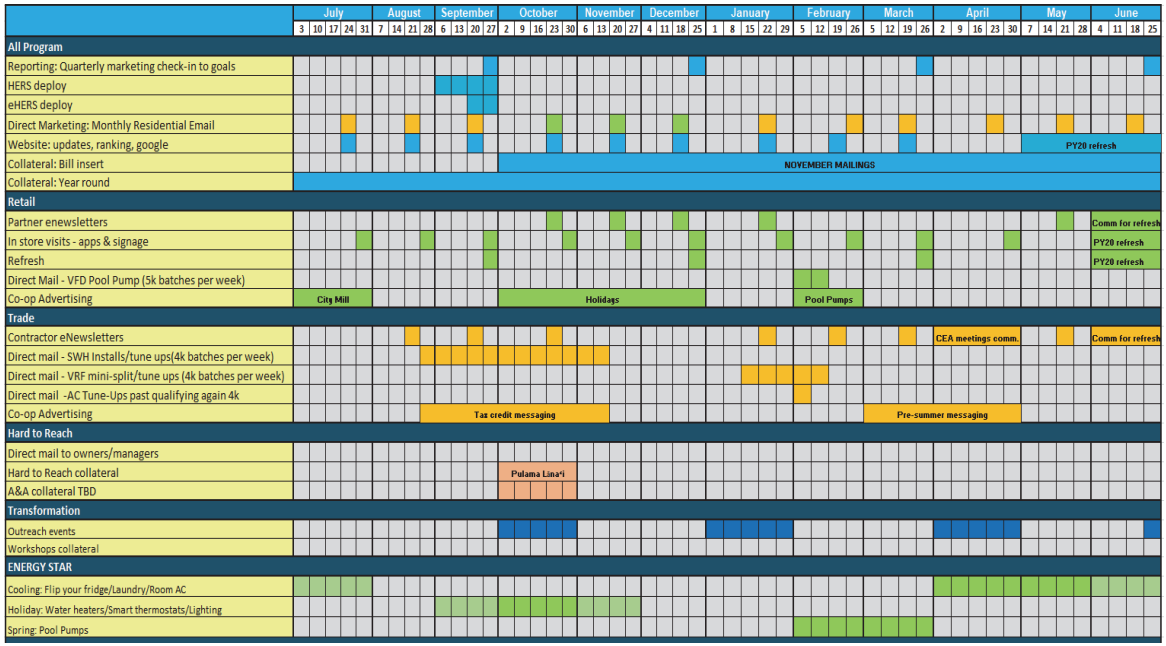
Trade Allies	Customer Level Demand Savings (kW)	Customer Level Energy Savings (kWh First Year)	Customer Level Energy Savings (kWh - Life)	Customer Level Lifetime Energy Savings (%)
Costco	1,694	12,781,204	186,119,177	30.1%
Home Depot	1,320	9,714,235	143,268,780	23.1%
Customer in-house	4,455	15,118,846	41,429,138	6.7%
Walmart	258	1,940,176	29,102,634	4.7%
City Mill	214	1,602,990	24,009,530	3.9%
Sears	283	1,667,782	22,353,697	3.6%
Target	114	859,112	12,886,682	2.1%
Best Buy	178	1,286,616	12,391,510	2.0%
Alternate Energy	162	644,452	11,138,392	1.8%
Lowe's	115	747,700	9,563,109	1.5%
Poncho's Solar Service	97	436,434	8,688,084	1.4%
Sam's Club	63	469,563	7,018,231	1.1%
Air Source Air Conditioning	95	347,372	5,210,580	0.8%
Haleakala Solar	53	238,622	4,772,449	0.8%
Navy Exchange (NEX)	48	285,703	3,936,676	0.6%
Ace	34	259,052	3,885,783	0.6%
Hawaiian Solar & Plumbing	43	193,366	3,867,329	0.6%
Grand Solar	42	187,195	3,743,904	0.6%
Island Solar Service, Inc. - Oahu	39	172,796	3,455,911	0.6%
Ac Warehouse-HNL	59	214,373	3,215,600	0.5%
Remaining Allies	1,325	5,436,041	78,982,801	12.8%
Total	**10,694**	**54,603,632**	**619,039,997**	**100.0%**

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 PY18.

- Program Communication
  - Behavioral Energy Awareness / Responsibility
- Upstream and Midstream
  - High-Efficiency Appliances
  - High-Efficiency Electronics
  - High-Efficiency Lighting
  - High-Efficiency Water Heating
  - 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



PY18 Marketing Calendar displaying the multi-channel effort to promote all measures across the residential programs.

Impacts

As in years past, the bulk of energy savings within the REEM portfolio derive from Hawai‘i Energy’s upstream lighting program and Home Energy Reports. In terms of first-year energy savings, Hawai‘i Energy’s upstream lighting program contributed over 16,749,767 or 41% of REEM’s total 40,543,675 first-year kWh, while Home Energy Reports contributed 12,149,837 or 30% of first-year kWh. Notable for PY18 is that while upstream lighting was still a large percentage of overall savings, the PY18 total kWh from lighting was over 51% less than PY17’s total of 32,591,782 first-year kWh. Also, Home Energy Reports were down year-over-year in first-year energy savings from 13,793,419 to 12,149,837 kWh, a 12% reduction. Collectively, while certain measures such as VRF Air-Conditioners, Rid-A-Fridge and televisions more than doubled their impacts in PY18, the year-over-year total impacts from the residential programs resulted in a 25% decrease from PY17 due to lighting and Home Energy Reports savings attribution reductions.

In terms of *lifetime* energy savings, upstream lighting is the predominant contributor with over 58%, down from over 80% in PY17 based on the concerted effort to decrease reliance on lighting. 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. The refrigerator trade-in program saw an increase in overall volume, which increased total lifetime savings by 35% from PY17 to 46,142,411 kWh.

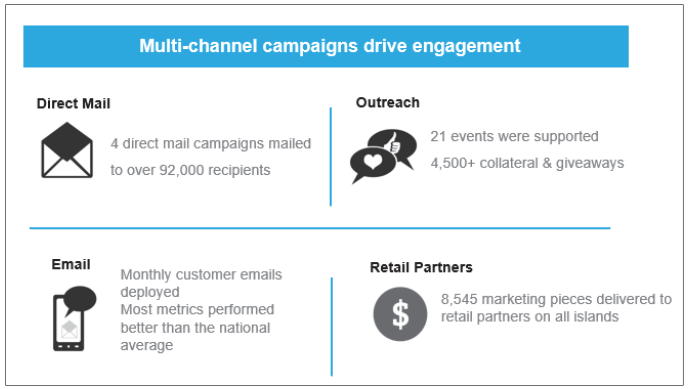
In addition to energy savings, the REEM portfolio contributed 8,564 kW in peak demand savings. See **Table 38** for a full breakdown of REEM measures, incentives, and their impacts.

Table 38
REEM - Residential Energy Efficiency Measures Program Impacts

Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh Life)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			$	%	$	%	$	%
LED Lighting	1,168,882	2,229	26.0%	16,749,767	41.3%	251,246,499	58.3%	15.0	4.4	$51,400,765	55.8%	$11,636,367	22.6%	$1,796,466	31.1%
Solar Water Heating	1,430	574	6.7%	2,568,124	6.3%	51,362,481	11.9%	20.0	1.2	$11,002,155	11.9%	$9,493,800	18.4%	$1,025,500	17.7%
Refrigerator w/ Trade In	4,582	537	6.3%	3,295,886	8.1%	46,142,411	10.7%	14.0	1.9	$10,198,391	11.1%	$5,498,400	10.7%	$733,800	12.7%
Variable Refrigerant Flow Air Conditioners	2,157	583	6.8%	2,126,434	5.2%	31,896,512	7.4%	15.0	0.4	$8,537,701	9.3%	$18,998,081	36.8%	$354,950	6.1%
Peer Group Comparison	207,000	4,050	47.3%	12,149,837	30.0%	12,149,837	2.8%	1.0	0.0	$2,366,222	2.6%	$0	0.0%	$0	0.0%
Rid-A-Fridge (Refrigerator)	1,042	128	1.5%	783,804	1.9%	10,973,258	2.5%	14.0	31.6	$2,425,124	2.6%	$76,770	0.1%	$76,770	1.3%
TV	16,020	140	1.6%	1,159,630	2.9%	6,957,781	1.6%	6.0	0.8	$1,542,587	1.7%	$1,902,375	3.7%	$160,200	2.8%
Heat Pump Water Heater	228	42	0.5%	327,346	0.8%	3,273,458	0.8%	10.0	1.7	$690,978	0.8%	$410,400	0.8%	$59,600	1.0%
Clothes Washer	2,132	54	0.6%	281,954	0.7%	3,101,499	0.7%	11.0	0.6	$739,710	0.8%	$1,172,600	2.3%	$72,080	1.2%
Whole House Fan	459	41	0.5%	127,438	0.3%	2,548,757	0.6%	20.0	11.5	$634,109	0.7%	$55,080	0.1%	$34,425	0.6%
Clothes Dryer	1,248	36	0.4%	180,590	0.4%	2,528,253	0.6%	14.0	1.0	$600,485	0.7%	$624,000	1.2%	$40,340	0.7%
Dehumidifiers	390	17	0.2%	145,795	0.4%	1,749,541	0.4%	12.0	4.6	$355,040	0.4%	$78,000	0.2%	$8,020	0.1%
Rid-A-Fridge (Freezer)	130	16	0.2%	97,829	0.2%	1,369,606	0.3%	14.0	31.6	$302,687	0.3%	$9,585	0.0%	$9,585	0.2%
Central AC Retrofit	39	23	0.3%	89,823	0.2%	1,347,349	0.3%	15.0	0.7	$350,247	0.4%	$468,000	0.9%	$39,000	0.7%
Window AC w/ Trade In	551	29	0.3%	103,438	0.3%	930,943	0.2%	9.0	1.1	$262,208	0.3%	$247,950	0.5%	$27,625	0.5%
Air Purifiers	262	10	0.1%	89,330	0.2%	803,968	0.2%	9.0	3.2	$168,206	0.2%	$52,400	0.1%	$5,600	0.1%
VFD Pool Pumps	142	1	0.0%	74,341	0.2%	743,409	0.2%	10.0	1.1	$118,546	0.1%	$106,500	0.2%	$17,750	0.3%
Solar Attic Fan	195	0	0.0%	27,020	0.1%	540,400	0.1%	20.0	2.5	$73,359	0.1%	$29,250	0.1%	$9,750	0.2%
Residential Custom	294	16	0.2%	52,213	0.1%	469,918	0.1%	9.0	0.6	$137,405	0.1%	$227,957	0.4%	$227,957	3.9%
Advance Power Strips	649	5	0.1%	45,795	0.1%	228,977	0.1%	5.0	2.2	$50,198	0.1%	$22,620	0.0%	$17,490	0.3%
Faucet Aerator	1,262	25	0.3%	26,015	0.1%	130,076	0.0%	5.0	9.1	$78,259	0.1%	$8,641	0.0%	$5,727	0.1%
Smart Thermostats	85	0	0.0%	10,232	0.0%	112,551	0.0%	11.0	1.0	$17,220	0.0%	$17,000	0.0%	$4,250	0.1%
Soundbar	313	1	0.0%	12,162	0.0%	85,133	0.0%	7.0	1.1	$15,590	0.0%	$14,085	0.0%	$2,970	0.1%
Freezer	64	0	0.0%	2,376	0.0%	40,392	0.0%	17.0	0.1	$7,654	0.0%	$51,200	0.1%	$1,920	0.0%
Dishwasher	136	0	0.0%	3,310	0.0%	36,406	0.0%	11.0	0.1	$7,306	0.0%	$54,400	0.1%	$4,080	0.1%
Showerhead	87	6	0.1%	5,561	0.0%	27,803	0.0%	5.0	11.8	$18,494	0.0%	$1,566	0.0%	$824	0.0%
Power Switch	235	1	0.0%	5,533	0.0%	27,664	0.0%	5.0	4.3	$6,026	0.0%	$1,410	0.0%	$1,402	0.0%
Refrigerator	20	0	0.0%	1,808	0.0%	25,316	0.0%	14.0	0.3	$5,583	0.0%	$16,000	0.0%	$5,000	0.1%
Residential A/C	1	0	0.0%	284	0.0%	284	0.0%	1.0	0.2	$50	0.0%	$300	0.0%	$150	0.0%
Accounting	1,696	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$285,550	0.6%	$1,039,778	18.0%
Total	**3,688,731**	**8,564**	**100.0%**	**40,543,675**	**100.0%**	**430,850,481**	**100.0%**	**10.6**	**1.8**	**$92,112,305**	**100.0%**	**$51,560,286**	**100.0%**	**$5,783,009**	**100.0%**

Expenditures

Based on final budget allocations, Hawai‘i Energy distributed over 96% 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. Complementary efforts for maximum exposure in all possible marketing venues included: monthly email newsletters, marketing modules in quarterly Home Energy Reports and bill inserts in the November utility electric bill mailing. Results showed high click-through rates – above national averages – for search campaigns, and over 340,000 bill inserts distributed



Some of the various campaigns deployed in PY18.

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.

Hawai‘i Energy at the January 2019 BIA Home Show.

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

Accomplishments

Popular Offerings

Figure 6 summarizes consumer participation for selected REEM measures. The refrigerator w/Trade In offer continues to be the most popular program for customer purchases resulting in a mail-in rebate.

Figure 6: Select REEM Participation

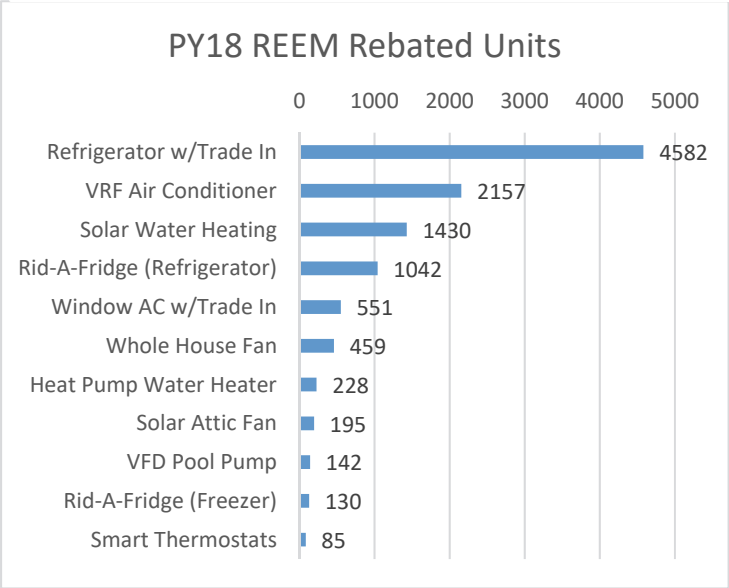
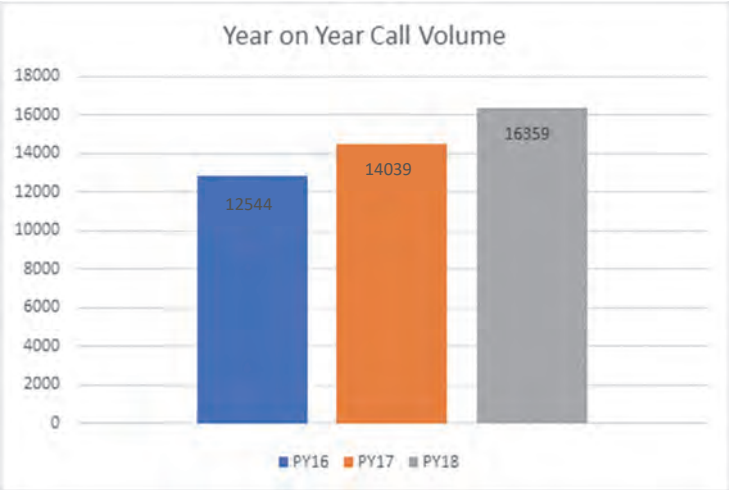


Figure 7: PY18 Call Center Volume



Quality Customer Support

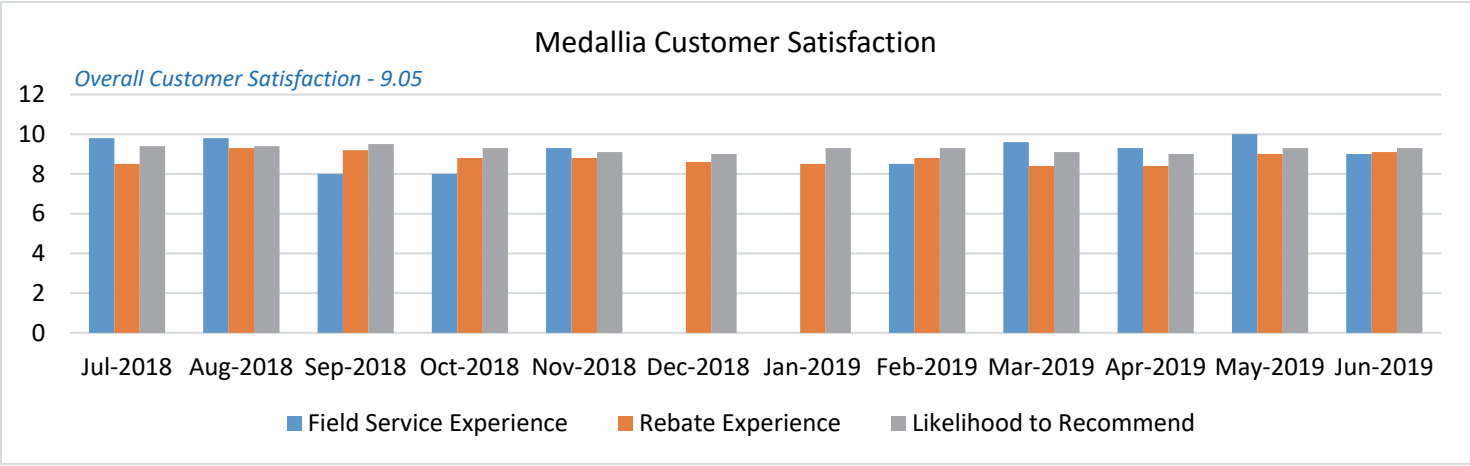
Hawai'i Energy's Energy Advisors educate customers every day on the various ways to save energy, through both program offerings and behavioral modifications that can be enacted right away. During PY18, Hawai'i Energy's residential call center handled 16,359 customer calls. This represents an increase of over 2,300 calls from PY17, and another year-over-year increase of general customer inquiries regarding Hawai'i Energy offers including a significant increase of calls regarding Home Energy Reports. These reports have grown to be a large fraction of overall calls, in line with the Program's strategy of impacting customer engagement, as seen in the year-on-year call volume chart displaying an upward trend. Overall, half of the inquiries were from customers, who called to discuss residential rebates and learn new ways they could save on their home electricity bills. See **Figure 7** for a chart showing Hawai'i Energy's call center volume throughout the year.

Customer Experience Management

Hawai'i Energy continues to leverage implementing its customer experience management tool, Medallia. When a customer receives a Hawai'i Energy rebate, Medallia sends them an automated email survey that solicits feedback on every phase of their experience, including field service, satisfaction with the rebate process and overall willingness to recommend Hawai'i Energy's programs. The Program sent out 4,330 surveys in PY18, which generated a response rate of 22.3% and an overall satisfaction rating averaging 9.05 out of 10**. Figure 8** 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 8: PY18 Customer Satisfaction Ratings



In terms of official complaints, there were four logged in PY18 out of over 16,000 calls received throughout the year. 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 1,430 solar water heating systems installed and incentivized either directly or through participating lenders. The Program saw a 10% increased uptake in PY18 due to the increased incentive of $750 from $500 in PY17. SHW 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 quality control program of inspecting no more than 20% of all installations. 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* – The midstream program launched through Lowe’s in PY17 resulted in a substantial increase of 228 heat pumps sold in PY18 versus 81 in PY17. While heat pumps represent a smaller portion of the high-efficiency water heating program due to the State of Hawai‘i’s long standing policy efforts towards solar water heating, this technology still represents a viable option for smaller household configurations where solar water heating systems cannot be installed. The Program continues to direct efforts towards heat pumps as a potential means for a combination of efficiency savings with demand response potential as this technology evolves.

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

Table 39 **REEM High Efficiency Water Heating Program Impacts**															
Category	**Units**	**Program Demand (kW)**		**Program Energy (kWh First Year)**		**Program Energy (kWh Life)**		**Average Measure Life (Years)**	**TRB/ TRC**	**Total Resource Benefit (TRB)**		**Total Resource Cost (TRC)**		**Incentives**	
		kW	**%**	**kWh**	**%**	**kWh**	**%**			**$**	**%**	**$**	**%**	**$**	**%**
Solar Water Heating	1,430	574	93.2%	2,568,124	88.7%	51,362,481	94.0%	20.0	1.2	$11,002,155	94.1%	$9,493,800	95.9%	$1,025,500	94.5%
Heat Pump Water Heater	228	42	6.8%	327,346	11.3%	3,273,458	6.0%	10.0	1.7	$690,978	5.9%	$410,400	4.1%	$59,600	5.5%
Total	**1,658**	**616**	**100.0%**	**2,895,470**	**100.0%**	**54,635,938**	**100.0%**	**18.9**	**1.2**	**$11,693,132**	**100.0%**	**$9,904,200**	**100.0%**	**$1,085,100**	**100.0%**

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

Table 40 **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 (Pct)**
Oahu	942	66%	380	1,700,034	34,000,680	$673,750	66%
Hawaii Island	253	18%	100	448,154	8,963,083	$183,000	18%
Maui	233	16%	93	416,362	8,327,239	$167,250	16%
Molokai	2	0%	1	3,574	71,478	$1,500	0%
Total	1,430	100%	574	2,568,124	51,362,481	$1,025,500	100%

See **Figure 9** for a list of participating contractors that completed solar water heater installations in PY18, sorted by island.

Figure 9: Solar Water Heating Contractors

OAHU

AFFORDABLE SOLAR CONTRACTING	HAWAIʻI ENERGY CONNECTION, LLC	PV TECH
ALAKA'I MECHANICAL CORP	HAWAIIAN ENERGY SYSTEMS INC	REVOLUSUN, LLC
ALLEN'S PLUMBING	HI-POWER SOLAR, LLC	SOLAR COOL HAWAIʻI
ALTERNATE ENERGY	HI-TECH PLUMBING CORPORATION	SOLAR HELP HAWAIʻI
C&J SOLAR SOLUTIONS	HO'A SOLAR INC	SOLAR SERVICES HAWAIʻI
C2C SOLAR, LLC	ISLAND SOLAR SERVICE - BIG ISLAND	SOLAR SERVICES HAWAIʻI - MAUI
COOL X ENERGY	ISLAND SOLAR SERVICE, INC. - OʻAHU	SUN KING
DRAINPIPE PLUMBING & SOLAR	KAMA'ĀINA PLUMBING & RENOVATIONS	SUNETRIC
ENERGY UNLIMITED, INC.	M. TORIGOE PLUMBING, INC.	TNH PLUMBING
ENERGYPRO HAWAIʻI	MAC'S PLUMBING	TRUE GREEN SOLAR, LLC
GRAND SOLAR	PACIFIC ENERGY STRATEGIES, LLC.	
HALEAKALA SOLAR-Peterson Dean	PONCHO'S SOLAR SERVICE	

MAUI

ACCURATE PLUMBING	PONCHO'S SOLAR SERVICE
ALLEN'S PLUMBING	SOUTH PACIFIC PLUMBING
ALTERNATE ENERGY	STEVE'S PLUMBING SERVICE
HALEAKALA SOLAR-Peterson Dean	SUN KING
MAUI PACIFIC SOLAR	SUNNY SOLUTIONS, INC.
MAUI SOLAR PROJECT	SUNSHINE SOLAR LLC
PDH HALEAKALA SOLAR	
PERRIN PLUMBING, LLC	

HAWAIʻI ISLAND

DRAINPIPE PLUMBING & SOLAR	PONCHO'S SOLAR SERVICE
GRAND SOLAR	QUALIFIED PLUMBING
HALEAKALA SOLAR-Peterson Dean	RT'S PLUMBING, INC
HAWAIIAN SOLAR & PLUMBING	SOLAR AIDE COMPANY
HAWAIIAN SOLAR SOLUTIONS	
ISLAND SOLAR SERVICE, INC. - OAHU	
KEITH SHIGEHARA PLUMBING, INC.	
KONA SOLAR	

High-Efficiency Lighting

In PY18, the High-Efficiency Lighting program achieved energy savings of 16,749,767 first year kWh and 2,229 kW of demand savings with $1,796,466 in incentives.

Consistent with the three-year plan to transition from CFLs to LEDs, Hawaiʻi Energy's promotion of compact fluorescent (CFL) bulbs ended at the end of PY17, resulting in 100% of the lighting expenditures towards LED technology in PY18. From a savings perspective, a tiered reduction in the program attribution (Net-to-Gross (NTG) ratio) was applied for upstream lighting in PY18, reflecting a drop in residential lighting NTG ratio to an average of 0.575, down from 0.79 in PY17. Accordingly, PY18 total kWh from lighting was over 49% less than PY17's total of 32,591,782 first-year kWh.

The average incentive per LED bulb was dramatically lowered throughout the year, ending at an average of $1.54 in accordance with the planned reduction around lighting to reduce portfolio spending in PY18. This is a decrease of over 28% in the per bulb incentive from PY17 at $2.14 to keep up with market pricing trends and mitigate free-ridership. A significant amount of effort continued to be expended in PY18 to vigilantly monitor market conditions, as LED lighting technologies and prices rapidly evolved, and will continue into the next triennial period.

Marketing efforts boosted awareness and web traffic with monthly e-newsletters 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 on Instagram, Facebook and Twitter.

See **Table 41** for details.

Table 41
REEM High Efficiency Program Lighting Program Impacts

Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh Life)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives ($)	
		kW	%	kWh	%	kWh	%			$	%	$	%	$	%
LED Lighting	1,168,882	2,229	100.0%	16,749,767	100.0%	251,246,499	100.0%	15.0	4.4	$51,400,765	100.0%	$11,636,367	100.0%	$1,796,466	100.0%
LED Lighting	**1,168,882**	**2,229**	**100.0%**	**16,749,767**	**100.0%**	**251,246,499**	**100.0%**	**15.0**	**4.4**	**$51,400,765**	**100.0%**	**$11,636,367**	**100.0%**	**$1,796,466**	**100.0%**

High-Efficiency HVAC

For PY18, the High-Efficiency Air-Conditioning program achieved first-year energy savings of 2,620,232 kWh and demand savings of 692 kW with $473,920 in incentives.

The bulk of these savings were attributed to high-efficiency VRF Split air-conditioners, accounting for about 89.2% of residential HVAC savings and 75% of residential HVAC incentives. As the more strenuous program efficiency requirements were continued into PY18, program participation increased year over year by 73%, a direct correlation to the continued support by key CEAs in this sector.

Dehumidifiers were added to the portfolio this past year as part of the Rapid Response Program on Hawai‘i Island as a downstream mail-in rebate for customers facing air quality issues and were then added as part of the standard midstream agreements with retailers in Maui and Honolulu counties. The $1,000 central AC retrofit incentive that was introduced in PY17 realized 39 paid units in PY18.

All of Hawai‘i Energy’s other residential HVAC offerings saw increased performance in PY18, 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 AC Trade-In program wherein customers receive an incentive to purchase a new ENERGY STAR® model and recycle their old, inefficient model. See **Table 44** for details.

Table 42 **REEM High Efficiency Air Conditioning Program Impacts**															
Category	**Units**	**Program Demand (kW)**		**Program Energy (kWh First Year)**		**Program Energy (kWh Life)**		**Average Measure Life (Years)**	**TRB/ TRC**	**Total Resource Benefit (TRB)**		**Total Resource Cost (TRC)**		**Incentives ($)**	
		kW	**%**	**kWh**	**%**	**kWh**	**%**			**$**	**%**	**$**	**%**	**$**	**%**
Variable Refrigerant Flow Air Conditioners	2,157	583	84.2%	2,126,434	81.2%	31,896,512	81.8%	15.0	0.4	$8,537,701	83.6%	$18,998,081	95.6%	$354,950	74.9%
Whole House Fan	459	41	5.9%	127,438	4.9%	2,548,757	6.5%	20.0	11.5	$634,109	6.2%	$55,080	0.3%	$34,425	7.3%
Dehumidifiers	390	17	2.4%	145,795	5.6%	1,749,541	4.5%	12.0	4.6	$355,040	3.5%	$78,000	0.4%	$8,020	1.7%
Central AC Retrofit	39	23	3.3%	89,823	3.4%	1,347,349	3.5%	15.0	0.7	$350,247	3.4%	$468,000	2.4%	$39,000	8.2%
Window AC w/ Trade In	551	29	4.1%	103,438	3.9%	930,943	2.4%	9.0	1.1	$262,208	2.6%	$247,950	1.2%	$27,625	5.8%
Solar Attic Fan	195	0	0.0%	27,020	1.0%	540,400	1.4%	20.0	2.5	$73,359	0.7%	$29,250	0.1%	$9,750	2.1%
Residential A/C	1	0	0.0%	284	0.0%	284	0.0%	1.0	0.2	$50	0.0%	$300	0.0%	$150	0.0%
Total	**3,792**	**692**	**100.0%**	**2,620,232**	**100.0%**	**39,013,785**	**100.0%**	**14.9**	**0.5**	**$10,212,714**	**100.0%**	**$19,876,661**	**100.0%**	**$473,920**	**100.0%**

Variable Refrigerant Flow Systems

Mini-split air-conditioning 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, 1,933 VRF systems (2 tons or less) were incentivized through a $150 rebate per outdoor unit.
- Larger VRF installations (2 to 3 tons) received a $250 rebate per outdoor unit, resulting in 224 rebates.

Combined, VRFs provided a calculated overall first-year energy savings of 2,126,434 kWh.

Window Air Conditioner

The Window Air Conditioner Trade-Up program, which offers residents a rebate for the purchase of a qualified window AC when surrendering an old working unit for pick-up and recycling, accepted 551 applications for a total of $27,625 in rebates. Rebates varied from $50 to $65 for the Rapid Response Program.

As a complement to the existing mail-in rebates, a new approach was initiated in PY18 to incentivizing the purchase, installation and recycling of energy-efficient window air conditioners. Affordable Home AC (AHAC), a new addition to the CEA program, customized an approach to work with local families to remove old window ACs and replace them with high-efficiency window ACs, and then team up with local company Refrigerant Recycling to recycle the old window AC units, creating a “one-stop shop” for window AC replacements. At the end of the PY, AHAC replaced 292 old window ACs.

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 PY18, Hawai‘i Energy incentivized purchases for 459 installations through a $75 rebate per system with a calculated first-year energy savings of 127,438 kWh.

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 a viable, affordable, and energy-efficient method for home cooling. Through a $50 per unit rebate, this year saw 195 purchases incentivized for 27,020 kWh of energy saved.

Smart Thermostats

Introduced in PY17 and continued in PY18, 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. Rebate applications were distributed throughout various retail partners including Best Buy, Home Depot and Lowes with a total of 85 units redeemed.

Some of the positive customer response to the HVAC programs can be attributed to consistent messaging regarding cooling suggestions. Monthly e-newsletters and promotional emails sent to over 160,000 Hawai'i residents during the summer months when cooling is top-of-mind drove traffic to the website describing various cooling options. In the January-April timeframe, messaging focused on tune-ups to maintain investments already made for efficient AC equipment. Home Energy Reports also utilized free-form text fields (FFTs) to specifically bring awareness to cooling tips and incentives. 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 PY18, the High-Efficiency Appliances program achieved first-year energy savings of 4,857,024 kWh and demand savings of 788 kW with $984,415 in incentives.

- Refrigerator Trade-Up – The refrigerator "Trade-Up" program remained a staple of Hawai'i Energy's High-Efficiency Appliance program, accounting for 11% of the REEM portfolio's lifetime energy savings and 70% of the High-Efficiency Appliance program's savings. The 4,582 refrigerator trade-in rebates in PY18 represented increased performance from 3,398 in PY17 and 2,230 in PY16, as retailers increased their promotion of the incentive to customers making purchase decisions on the sales floor. 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 continued to be a popular program and experienced another year of increased performance in PY18 as 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 and drink storage, constitute an important opportunity to reduce energy consumption and lower bills. By increasing to a $75 rebate across Honolulu, Maui, and Hawai'i counties and coordinating with haulers and recyclers, Hawai'i Energy was able to influence the recycling of 1,172 refrigerators and freezers in PY18, achieving a lifetime energy savings of 12,342,864 kWh. This was the second year that saw a doubling of prior year units collected as the programs grow in popularity via various marketing campaigns.

    - A spring direct mail campaign targeted over 90,000 recipients most likely to participate in the programs to promote the Rid-A-Fridge program. In addition to direct mail, e-newsletters, and utility bill insert mailings retail signage was key to increasing participation in the appliance programs. With the largest number of floor models, POP signage and oversized clings on all products called attention to those

refrigerators qualifying for the trade-up or Rid-A-Fridge rebate. The Hawaiʻi Energy website URL and a QR code for online rebates were 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, 30 participants (4 in Maui County and 26 on Oʻahu) opted to donate their rebates, for a total of $2,225 going to feed Hawaiʻi's hungry. Hawaiʻi 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 kūpuna. Customer donations of the Hawaiʻi Energy's incentives of $2,225 is the equivalent of feeding meals to 5,563 hungry people.

Hawaiʻi Energy was part of an effort to boost the island's regularly scheduled recycling efforts, joining forces with the Hala Kahiki youth basketball team on Lānaʻi island to solicit participants and assist with a highly successful Rid-A-Fridge event. In return for their support, the basketball team received $2,775 in donated incentives from island residents to support the team's travel goals.

- VFD Pool Pumps – Hawaiʻi Energy's VFD pool pump rebate program displayed steady performance in PY18 with 142 units rebated. The program accounted for 743,409 kWh of lifetime energy savings.

See **Table 43** for details.

Table 43
REEM High Efficiency Appliances Program Impacts

Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh Life)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			$	%	$	%	$	%
Refrigerator w/ Trade In	4,582	537	68.2%	3,295,886	67.9%	46,142,411	69.9%	14.0	1.9	$10,198,391	69.7%	$5,498,400	71.6%	$733,800	74.5%
Rid-A-Fridge (Refrigerator)	1,042	128	16.2%	783,804	16.1%	10,973,258	16.6%	14.0	31.6	$2,425,124	16.6%	$76,770	1.0%	$76,770	7.8%
Clothes Washer	2,132	54	6.8%	281,954	5.8%	3,101,499	4.7%	11.0	0.6	$739,710	5.1%	$1,172,600	15.3%	$72,080	7.3%
Clothes Dryer	1,248	36	4.6%	180,590	3.7%	2,528,253	3.8%	14.0	1.0	$600,485	4.1%	$624,000	8.1%	$40,340	4.1%
Rid-A-Fridge (Freezer)	130	16	2.0%	97,829	2.0%	1,369,606	2.1%	14.0	31.6	$302,687	2.1%	$9,585	0.1%	$9,585	1.0%
Air Purifiers	262	10	1.3%	89,330	1.8%	803,968	1.2%	9.0	3.2	$168,206	1.2%	$52,400	0.7%	$5,600	0.6%
VFD Pool Pumps	142	1	0.1%	74,341	1.5%	743,409	1.1%	10.0	1.1	$118,546	0.8%	$106,500	1.4%	$17,750	1.8%
Advance Power Strips	649	5	0.7%	45,795	0.9%	228,977	0.3%	5.0	2.2	$50,198	0.3%	$22,620	0.3%	$17,490	1.8%
Freezer	64	0	0.0%	2,376	0.0%	40,392	0.1%	17.0	0.1	$7,654	0.1%	$51,200	0.7%	$1,920	0.2%
Dishwasher	136	0	0.0%	3,310	0.1%	36,406	0.1%	11.0	0.1	$7,306	0.0%	$54,400	0.7%	$4,080	0.4%
Refrigerator	20	0	0.0%	1,808	0.0%	25,316	0.0%	14.0	0.3	$5,583	0.0%	$16,000	0.2%	$5,000	0.5%
Total	**10,407**	**788**	**100.0%**	**4,857,024**	**100.0%**	**65,993,495**	**100.0%**	**13.6**	**1.9**	**$14,623,889**	**100.0%**	**$7,684,475**	**100.0%**	**$984,415**	**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 PY18 and secured the participation of Costco Wholesale, who had not previously participated in a midstream program anywhere in the country. 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 Costco, Sears and Best Buy in PY18 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 16,020 ENERGY STAR® televisions and over 300 ENERGY STAR® sound bars sold throughout the year. Hawai'i Energy's promotional efforts were timed 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 and were promoted via emails either in messaging or fun videos.

Energy Savings Kits

Hawai'i Energy continued its suite of online offerings in PY18 through the Energy Marketplace. An important aspect of the marketplace is to provide customers the ability to purchase items that are still difficult to obtain through a traditional retail channel. Customers can purchase individual small-measure items directly at reduced prices and shipping fees along with temporary kit promotions. Kits were promoted via email within the respective month during which 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. The customer kit promotion in October resulted in 1,888 LED A19s, 524 bathroom aerators and 262 kitchen aerators delivered to customer homes.

A new CEA kit was provided to solar photovoltaic installation contractors Sunrun and Hawai'i Energy Connection, who both chose to supplement customer offerings with the new Hawai'i Energy kit to reinforce reduction of energy usage in conjunction with energy production.

This year, the Market Transformation program also leveraged the Marketplace by providing kits to Aloha United Way 211 Call Center agents who attended a Continuous Energy Improvement (CEI) cohort workshop to incentivize participation and engagement.

- Marketplace: A notable addition for PY18 was a Power Switch with a total of 235 units. This switch eliminates standby power loss and the hassle of unplugging devices by allowing users to shut off power to connected electronics. Advanced power strips continued to be popular with customers, with a total of 489 units delivered to households through the Marketplace.
- Consumer Promo Kit: The first promotional kit was offered at a highly discounted $10 in October of 2018, which included a box of four LED A19 bulbs, a kitchen aerator and two bathroom aerators with free shipping. A bonus kit was offered at checkout to purchase another eight-pack

An example of website and email graphics used to promote the mail-order Energy Saving Kits along with bonus offer.

of LED A19 bulbs in either a warm or daylight color temperature for another $10 including shipping. This promotion sold 262 kits with 37 warm light and 68 daylight bonus kits.

- CEA Promo Kits: Kits included a four-pack of 60W A19 bulbs (two 2700K & two 5000K), one Kitchen Aerator, two Bathroom Aerators.
- CEI Promo Kits: Kits included a four pack of 60W A19 bulbs (two 2700K & two 5000K), one Kitchen Aerator, one TrickleStar Power Switch, two Bathroom Aerators.

Refer to Attachment B for *High-Efficiency Electronics* and *Energy Savings Kits* detailed savings numbers for PY18.

Behavioral Energy Awareness

In PY18, Hawaiʻi Energy's Home Energy Report (HER) program was refreshed and revamped with a different analytical approach, and a new customer look emphasizing positive feedback by grouping and comparing homes rather than neighbors across Hawaiʻi, Honolulu, and Maui Counties. The program distributed personalized HERs to all eligible customers to provide insight into their electricity consumption and how it compares to that of similar homes. 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, Hawaiʻi 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 reports continue to garner 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 Hawaiʻi Energy. The home energy comparison report continued to be one of Hawaiʻi Energy's most discussed programs, with customers frequently contacting the call center, approaching the Hawaiʻi Energy booth at various events, and talking to their friends and families about their most recent report.

In PY18, Hawaiʻi Energy distributed over 1.3 million hard-copy personalized HERs via mail to almost 260,000 unique customers. Based on estimated savings impacts, these reports accounted for over 12,000,000 kWh in first year energy savings, or about 47% of total REEM savings. See **Table 44** for details.

Sample Home Energy Report showing the new layout and content recommending further action to reduce energy costs.

Table 44 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 (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives ($)	
		kW	%	kWh	%	kWh	%			$	%	$	%	$	%
Peer Group Comparison	207,000	4,050	100.0%	12,149,837	99.9%	12,149,837	98.9%	1.0	0.0	$2,366,222	99.0%	$0	0.0%	$0	0.0%
Smart Thermostats	85	0	0.0%	10,232	0.1%	112,551	0.9%	11.0	1.0	$17,220	0.7%	$17,000	92.3%	$4,250	75.2%
Power Switch	235	1	0.0%	5,533	0.0%	27,664	0.2%	5.0	4.3	$6,026	0.3%	$1,410	7.7%	$1,402	24.8%
Total	**2,484,320**	**4,051**	**100.0%**	**12,165,602**	**100.0%**	**12,290,052**	**100.0%**	**1.0**	**129.8**	**$2,389,469**	**100.0%**	**$18,410**	**100.0%**	**$5,652**	**100.0%**

Custom Residential Energy Efficiency Measures (CREEM)

The Custom Residential Energy Efficiency Measures (CREEM) consisted of two categories: residential new construction and home energy monitoring through the Advanced Home Energy Insights study. The residential new construction category was designed to increase energy efficiency in new homes, incentivizing builders to exceed existing code requirements. The home energy monitoring program helped customers manage their energy usage and furnished the Program with end-use insights. **Table 45** summarizes the combined impacts of these two programs.

Table 45 CREEM Program Impacts															
Category	Submittal Quantity	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	%			$	%	$	%	$	%
Residential Custom	21	23	100.0%	162,877	100.0%	771,820	100.0%	4.7	1.9	$159.673	100.0%	$85,550	100.0%	$85,550	100.0%
Total	21	23	100.0%	162,877	100.0%	771,820	100.0%	4.7	1.9	$159.673	100.0%	$85,550	100.0%	$85,550	100.0%

Expenditures

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

Residential New Construction

To improve the efficiency and comfort of a new home, the Residential New Construction (RNC) program provided technical support and incentivized builders and developers to integrate energy efficient measures into newly constructed homes or homes going through a complete rehabilitation. Incentivized measures were tiered for high-efficiency LED lighting, ENERGY STAR® appliance options, and highly energy efficient cooling systems. Hawaiʻi Energy also provided education to expand the efficiency options offered by developers to exceed the 2015 International Energy Conservation Code (IECC) standards.

The RNC program incentivized 90 newly-constructed homes in 21 individual submittals (**Table 45**) in the ʻEwa plain at the SEAbridge development and the newer Kaʻuluokahaʻi project, a Department of Hawaiian Homelands (DHHL) master-planned community in Kapolei, both developed by Gentry Homes. The homes' energy efficiency performance was estimated utilizing the Home Energy Rating System (HERS) index with Gentry voluntarily providing information for each home. The HERS index follows a scoring system from 0 to 100 (the lower the number, the more efficient the home). In PY18, the average HERS index for all homes was 44, an improved performance level compared to the IECC 2015 standard of 52. Additionally, five homes incentivized at Ka'uluokaha'i had an average HERS index of 41 and were outfitted with high-efficiency LED lighting, new ENERGY STAR® appliances, and central air-conditioning systems with a Seasonal Energy Efficiency Ratio (SEER) rating of 20 or greater (the higher the SEER rating, the more efficient the cooling equipment). The Kaʻuluokahaʻi community is located on a 24.5-acre development which began construction in 2015 and will provide 160 homes to Native Hawaiians on a waitlist for residential, farming, or ranching homesteads. The program's success was directly attributed to efforts in broadening industry influence and expanding upon established relationships with trade allies, organizations, developers, and other industry decision makers.

Photo credit: DHHL. DHHL Kaʻuluokahaʻi development from Gentry Homes https://www.hawaiibusiness.com/hawaiian-homesteads-backlog/

Home Energy Monitoring

In PY18, Hawaiʻi Energy continued its home energy monitoring efforts by collaborating with Sense to train local contractors to install their device in Oʻahu homes. The Program also collaborates with Sense to provide feedback that will enhance their data analytics, especially for Hawaiʻi homes with solar PV installations. Sense is a leading manufacturer of in-home energy monitoring devices that utilizes high-frequency whole-home energy monitoring and advanced learning algorithms to identify unique devices in homes, track energy usage in real-time and over time, and alert customers to notable changes in energy usage through monthly homeowner updates. The resulting Advanced Home Energy Insights Study researched the impact of emerging technologies on energy usage through user engagement. The initiative was designed to explore the costs and benefits of a home energy monitor that identifies patterns of usage in very high-frequency usage measurements, communicates with the occupant over wireless internet connections, and provides engagement through smart phone application to enable new energy-saving insights. Study participants agreed to answer survey questions and share energy usage data, such as device application usage metrics and other data related to household energy usage, for a period of 24 months. The study also allowed for an opt-in participation with an agreement to the terms of sharing monitor data with the program for internal purposes only.

After installation of the home energy monitor by qualified installers, Hawai'i Energy collected and analyzed information regarding energy, device and equipment patterns in Hawai'i homes to support energy-saving communications and measurements. One of the primary goals of the initiative is to support customers with identification of wasted or excessive energy use in their homes via real-time and historical data tracking tools.

The implementation of the study included the following operational metrics:

- Installations occurred at 74 customer homes.
- There were 4 CEAs trained for home installations.
- Hawai'i Energy teamed with a local distributor to stock the home energy monitors locally.
- Of the installations, 35 homes have solar PV systems.
- 34 unique device types were identified in customer homes in addition to tracking whole-home energy use and solar production.

As the participation and sample size in the study grows, the deployment of in-home energy monitors will provide an increasing value of assessing energy savings potential across homes in Hawai'i, unlocking future energy services and exploring how the information developed and communicated by these devices can be used to inform market conditions, potential, and customer decisions.

Sense home energy monitor and smart phone user interface

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, Hawaiʻi Energy teams with contractors on all islands to offer incentives for those very services.

In PY18, the program continued two offerings: a Solar Water Heater Tune-Up program and a Residential AC Tune-Up program. The AC Tune-Up program was a new offering in PY16 that saw immediate success and continues to gain traction every year as customers and CEAs take advantage of this incentive. Both offerings are delivered through the Trade Ally consumer channel, and Hawaiʻi 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 PY18, 2,056 tune-ups were rebated at $100 each on qualifying solar water heating tune-ups. There were 47 actively participating contractors for this program year. Hawaiʻi 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, which was the same as in PY17. Over 120 units were 20 – 30 years old, while 17 were over 30 years old. Overall, the condition of the units was "good," with only 14% 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 AC Tune-Up Program

In its third year, Hawaiʻi Energy's Residential AC Tune-Up program was introduced through participating contractors to encourage residents to keep their central or split-ACs running at peak performance and optimal efficiency. The Program processed 4,833 tune-up rebate applications for central and split air-conditioning units, doubling the amount completed in PY17, becoming the most popular and highest volume rebate processed (non-upstream or midstream)— surpassing refrigerator trade-in.

E-newsletters are used throughout the year to promote various offers, including AC Tune-Ups.

The AC Tune-Up program has been well received by customers and contractors alike, with many reporting that their services were long overdue. The incentive was increased to $100 in PY18, paid directly to contractors and passed along to customers through an instant deduction on their invoice, which provided the motivation needed to push customers to maintain their HVAC systems on a regular basis.

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 previous direct mail campaigns, letters were sent in January and February 2019 to over 90,000 targeted residents based on likelihood to participate. See **Figure 10** for a list of participating contractors that completed air conditioning installations or performed tune-ups in PY18, by island.

Figure 10: PY18 AC Tune-Up Participating Contractors

O‘AHU

AC GENERAL AIR CONDITIONING INC	ALOHA STATE REFRIGERATION & AC INC	PRISTINE AIR CONDITIONER
ADVANCED A/C CONTRACTING	ALTERNATE ENERGY - O‘AHU	PROGRESSIVE AIR CONDITIONING
AIR CONDITIONING CONCEPTS	AMERICAN AIR CONDITIONING	REVOLUSUN, LLC
AIR CONDITIONING EXPERTS	B&B AIR CONDITIONING	RMA SERVICES LLC
AIR CONDITIONING UNLIMITED	COOL X ENERGY	RUTAN REFRIGERATION
AIR PERFECTION	COOLING TOWER AC, INC	SOLAR COOL HAWAI‘I
AIR SOURCE AC	CRAIG'S AIR CONDITIONING	STANDARD AIR
AIRMASTERS	D & D AIR CONDITIONING	
ALOHA STATE REFRIGERATION & AC INC	DIRECT AIR CONDITIONING	
ALTERNATE ENERGY - O‘AHU	HI-POWER SOLAR, LLC	
AMERICAN AIR CONDITIONING	KK AIR CONDITIONING LLC	
	KONA INDUSTRIES	

MAUI	HAWAI‘I ISLAND
AIR CONDITIONING OF MAUI INC	AC & REFRIGERATION LLC
C S MECHANICAL	AIRMASTERS
CENTRAL PACIFIC REPAIR LLC	HAWAI‘I AIR CONDITIONING INC
DAKINE AIR CONDITIONING & HEATING	HILO AIR AC & REFRIGERATION LLC
SUN KING - MAUI	HILO MECHANICAL, INC.
	KONA INDUSTRIES
	NO SWEAT AIR CONDITIONING, INC

Whole-Home Retrofit Program

In PY18, Hawai‘i Energy started developing elements of the Whole Home Retrofit program, a program designed to help residents comprehensively understand the home’s energy use. The Program performed market research on target audiences, identified the necessary elements in the audit process, characterized prescriptive measures for energy savings, and assessed the potential for future grid services initiatives.

A pilot audit service was conducted for a local non-profit, Responsive Caregivers of Hawai‘i (RCH), whose mission and vision was to “increase independence, productivity, and integration of persons with developmental disabilities and other special needs in Hawai‘i.” RCH is recognized for its responsive and

compassionate programs and services to ensure that all Hawaiʻi's citizens with developmental disabilities are integrated into the community." RCH owned two homes with a capacity of housing and providing care services for multiple residents, one in Kalihi-Pālama and the other in ʻAiea, each licensed and monitored by the State Department of Health. The home audits included a room-by-room assessment with surveys of appliances, water heating, lighting, water fixtures, and HVAC equipment. The recommendations from the audit resulted in participation in the Energy Smart 4 Homes (ES4H) program, including retrofits with high-efficiency lighting and water measures (refer to the RHTR section for further details on the ES4H program). For both homes, the audit also recommended energy-saving improvements in HVAC equipment and refrigerators. Program impacts were incorporated into the RHTR section.

With further program design, Hawaiʻi Energy will roll out implementation in the next program year and train and deploy CEA resources to extend program reach. Providing services through the CEA network will diversify the resource acquisition portfolio, creating more opportunities for growth.

Impacts

Overall, the RESM program's two offerings contributed energy savings of 2,119,716 first-year kWh and 4,207,479 lifetime kWh to the Residential portfolio. For details, see **Table 48.**

Table 48
RESM 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	%			$	%	$	%	$	%
Solar Water Heater Tune Up	2,056	61	14.4%	521,941	24.6%	2,609,704	62.0%	5.0	0.9	$574,208	67.1%	$616,800	29.8%	$205,600	30.6%
Residential A/C	4,833	361	85.6%	1,597,775	75.4%	1,597,775	38.0%	1.0	0.2	$281,195	32.9%	$1,449,900	70.1%	$467,025	69.4%
Accounting	1	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$450	0.0%	$25	0.0%
Total	**6,890**	**421**	**100.0%**	**2,119,716**	**100.0%**	**4,207,479**	**100.0%**	**2.0**	**0.4**	**$855,403**	**100.0%**	**$2,067,150**	**100.0%**	**$672,650**	**100.0%**

Expenditures

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

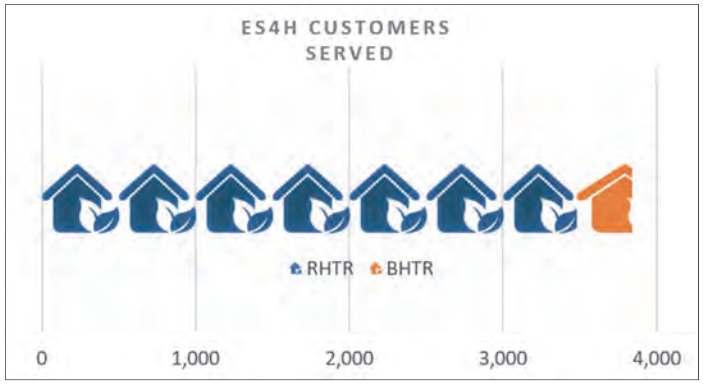
Residential Hard-To-Reach (RHTR)

Objectives

The Residential Hard-to-Reach program (RHTR) seeks to secure various projects among Hawaiʻi residents that have traditionally been underserved. This incentive category specifically addresses financial and landlord/tenant barriers to installing energy-saving technologies through direct installation and bulk appliance replacements.

Accomplishments

PY18 was another successful year for Hawaiʻi Energy's Hard-to-Reach programs, addressing the needs of underserved, underrepresented customer segments and communities. This segment typically requires additional resources and greater accessibility options. In PY18, Hawaiʻi Energy provided custom, turn-key services that simplified processes and reduced the barriers to participation for both the tenant and landlord while influencing supply chain allies to deliver a cost-competitive solution. The accomplishments were built on cultivating relationships with community stakeholders, government, and private sectors.



Pūlama Lānaʻi's Iwiole Hale multifamily property.

Energy Smart 4 Homes – Residential Direct Installation Program

The Energy Smart 4 Homes (ES4H) program provides residential single-family and multi-family customers with direct access to turnkey energy efficiency solutions, such as high-efficiency lighting and water measures and energy management devices. The properties serviced through the ES4H program were provided at no cost to residents and ownership management, including all labor and materials. In PY18, although the access to large multi-family complexes decreased on Oʻahu, the program deployed more resources in Maui and Hawaiʻi Counties and increased its service to single-family residences at targeted communities. The program worked with a channel partner to retrofit properties in both the public and private sectors.

The program served 3,840 customers and realized over 1,833,699 kWh in annual bill savings. Featured services were provided to properties managed and/or supported by a nonprofit, county, state, or federal agencies, included through one or more of the following: Hawaiʻi Island United Way, Hawaiʻi Island Community Development Corporation (HICDC), City & County of Honolulu's Department of Land Management (DLM), State Department of Hawaiian Home Lands (DHHL), State Hawaiʻi Housing Finance and Development Corporation's (HHFDC) Low-Income Housing Tax Credit (LIHTC) program, State Department of Human Services (DHS), and the U.S. Department of Housing and Urban Development (HUD) Emergency Shelter Grant.

ES4H provided 364 Business Hard-to-Reach installations (BHTR) and 3,476 Residential Hard-to-Reach installations (RHTR). The RHTR installations were completed at eligible residences requested by local property management companies, government agencies, and single-owner walk-up properties.

The RHTR increase in comparison to BHTR is a result of significant efforts to target single-family homes of lessees in Department of Hawaiian Home Land (DHHL) communities and the residential properties owned and managed under the Pūlama Lānaʻi management company on Lānaʻi (for a more detailed description, refer to the

Community-Based Energy Efficiency initiative in the Transformational Program section). These two underserved communities received retrofits at over 500 residences.

Other significant ES4H retrofit services in PY18 are noted below:

Hawaiʻi County

- The Hawaiʻi Island Community Development Corporation (HICDC), a non-profit organization whose mission is to assist low- and moderate-income residents obtain affordable housing, received retrofits at Mohouli Heights Senior Residences Phase 1 and Phase 2.
- 33 units were retrofitted at Ouli ʻEkahi Village in West Hawaiʻi, funded through the Hawaiʻi Housing Finance and Development Corporation (HHFDC) and provides rent-restricted housing to families that earn 60% or less of the surrounding median income.
- Senior communities were served at ʻĀinakea Senior Residences in Kapaʻau, an affordable rural housing community for residents age 62 years or older, built in part with financing obtained through the Low-Income Housing Tax Credit (LIHTC) program administered by the Hawaiʻi Housing Finance & Development Corporation (HHFDC).
- Retrofits subsidized by HUD Section 202 Supportive Housing for the Elderly program were completed at Captain Cook Elderly Housing Project, Haili Elderly in Hilo, and Hale Ulu Hoi I, II, & III in Hilo.
- Section 8 Housing residences were retrofitted at Kamaʼāina Hale, Laʻilani Apartments in Kailua-Kona, and City View Apartments in Hilo.
- 4 residences were retrofitted at Kīhei Pua Emergency Shelter, managed by Hope Services Hawaiʻi, provides round-the-clock short-term emergency shelter services to homeless individuals and families and is funded by the Hawaiʻi State Department of Human Services (DHS), County of Hawaiʻi, Hawaiʻi Island United Way, and the U.S. HUD Emergency Shelter Grant.

Maui County

- Over 200 multi-family and 200 single-family residences in Lānaʻi were retrofitted, with a majority of units serviced through partnership with Pūlama Lānaʻi, a management company to "develop, advance, and nurture a sustainable community for the island of Lāna'i." Additional retrofits were completed at Pūlama Lānaʻiʼs Iwiole Hale & Kanepuʼu Hale low-income and affordable apartment complexes, and at the Courts at Lanai (managed by Locations Hawaiʻi).
- Over 180 units at Honokowai Kauhale were serviced for this workforce housing development.
- ES4H installations were completed at Kīhei Sea Breeze in Maui, a 60-unit affordable housing complex; Piʻilani Gardens in Kīhei with 112 units; and Weinberg Court in Lahaina with 61 affordable units.
- Over 100 single-family homes were retrofitted in DHHL communities and in the town of Kaunakakai and surrounding communities.

City and County of Honolulu

- ES4H enjoyed the opportunity to service Makana O Ke Akua (Kapolei) which was established with a vision to create a structured transitional home to help recovering substance abuse offenders maintain a clean and sober lifestyle.

- Continued from the prior program year, retrofits were completed at residential apartments at the Good Samaritan Society – Pohai Nani (Kāneʻohe) a senior community that offers in-home services, senior apartments, assisted living, and a skilled nursing and rehabilitation center.
- Oʻahu BHTR-sector apartment communities that participated included the Holiday Parkway in Kapahulu, where residents were able to sign up for services through tabling events held in the entryway lobby periodically over a period of two months.

Old refrigerators like the one above were replaced with brand new, ENERGY STAR® models through the community Fridge Swap Hui event in Lānaʻi.

*"It's been incredibly helpful. Lānaʻi is special because we just can't go to the big box stores and bring it home. Any appliance is an added hassle and this has been a piece of cake…since we got rid of the old clunker we had about two months ago, the bills have dropped so I think the thing [old refrigerator] was hurting the bill." – **Lānaʻi resident***

Bulk Appliance Purchase Program

Residents of geographically isolated areas, such as the island of Lānaʻi, face multiple barriers in the supply chain including accessibility to retailers, transportation and field services, and disposal and recycle options. Hawaiʻi Energy collaborated with the island's largest landowner, Pūlama Lānaʻi, to provide energy efficiency measures through the Community-Based Energy Efficiency framework (refer to the Transformational Programs section for further details). At Iwiole Hale, a low-income and affordable multifamily property, over 100 inefficient refrigerators were replaced with new, discounted 18 cubic-foot ENERGY STAR® models. The effective delivery and installation of the new units was attributed to the quick responsiveness from supply chain allies and the clear communication between Hawaiʻi Energy, Pūlama Lānaʻi management, and the tenants. One of the Iwiole tenants remarked, "I've had one of these great refrigerators for about a month now and my bill went down around $30 already."

The success of the Pūlama Lānaʻi effort led to a similar Lānaʻi community-wide event called the *Fridge Swap Hui*. Lānaʻi residents were offered to replace their old refrigerators with highly incentivized energy-efficient refrigerators. At a kick-off community event at Dole Park in central Lānaʻi City, residents replaced their refrigerators with new 18 cubic-foot and 21 cubic-foot ENERGY STAR® models. A boys' basketball club helped with outreach activities and provided home energy audits to the participants. Delivery, installation, and removal of the old refrigerators were included at no cost to the residents.

In Hawaiʻi County, the Program engaged with the Office of Housing and Community Development (OHCD) to replace refrigerators at the Kulaimano Elderly Housing Project located in Hilo, a senior low-income housing property subsidized by the federal government's Housing and Urban Development division (HUD). Over 50 refrigerators were replaced, accounting for all the tenant residences at the property. To educate the seniors about energy efficiency, Hawaiʻi Energy conducted an energy literacy workshop with interactive games to help them find further ways to reduce their energy

consumption. Additionally, existing local supply chain providers installed, removed, and properly recycled the old refrigerators.

Impacts

The RHTR program accounted for energy savings of 1,830,003 first-year kWh and 17,876,130 lifetime kWh. The multi-family direct install program alone contributed 1,833,699 kWh in combined RHTR and BHTR energy savings with retrofits completed at 3,840 residences. The BHTR impacts represent about 10% of energy savings, as various residential customers fall under commercial, master-metered rate codes. See **Table 46** for a summary of impacts.

Table 46
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 Lighting	32,100	106	20.4%	795,080	43.4%	11,926,199	66.7%	15.0	35.2	$2,315,258	58.6%	$65,711	27.6%	$350,335	42.0%
Showerhead	2,068	242	46.5%	386,190	21.1%	1,930,952	10.8%	5.0	107.3	$683,655	17.3%	$6,372	2.7%	$77,637	9.3%
Faucet Aerator	3,397	126	24.3%	311,592	17.0%	1,557,960	8.7%	5.0	106.3	$445,998	11.3%	$4,196	1.8%	$54,989	6.6%
Residential Custom	173	25	4.9%	155,063	8.5%	1,550,634	8.7%	10.0	2.5	$330,546	8.4%	$131,900	55.4%	$131,900	15.8%
Advanced Power Strips	2,651	20	3.9%	182,077	9.9%	910,385	5.1%	5.0	29.3	$178,406	4.5%	$6,084	2.6%	$83,927	10.1%
Accounting	0	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$23,641	9.9%	$135,229	16.2%
Total		**519**	**100.0%**	**1,830,003**	**100.0%**	**17,876,130**	**100.0%**	**9.8**	**16.6**	**$3,953,862**	**100.0%**	**$237,904**	**100.0%**	**$834,017**	**100.0%**

Expenditures

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

TRANSFORMATIONAL PROGRAM

Introduction

Hawaiʻi 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, and to make these changed behaviors permanent. 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 institutional investment in energy efficiency measures.

Starting in 2015-16, Hawaiʻi Energy and key partners encouraged the passage of state legislation to strengthen and update the energy conservation code to the 2015 version of the International Energy Conservation Code (IECC), which formally went into effect in March 2019. The Transformational program supported the counties' amendment processes and adoption of the code and provided supportive testimony at county legislatures explaining the benefits of implementing a more progressive code. It is estimated that the new code will bring 4.7 million megawatt-hours and over $1 billion in savings to homes and businesses over the next twenty years. Hawaiʻi Energy and the State Energy Office also collaborated on a well-attended panel discussion at the Pacific Northwest AIA Convention / Pacific Building Trade Expo that highlighted changes to the commercial and residential sections of the code, with a hands-on, smaller group workshop the following day exploring real-life design and construction challenges to meeting and exceeding code. 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.

This year, the residential and business transformational program met all metrics for annual targets, well 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 47.**

Table 47 **Transformation Metrics**			
Key Focus Area		**Target**	**Achieved**
Behavior Modification			
Community Workshops (Hard-to-Reach, Energy Literacy)	"Energy Unplugged " Workshops	2,100	754.0
	"Sharing the Aloha" Workshops		753.0
	Blue Planet Foundation Community Workshops		1,273.0
	Community Education Support		85.0
Youth Education Workshops & Presentations	"Energy Unplugged" Student Energy Summit	1,000	94.5
	Blue Planet Foundation Student Workshops		1,329.0
Total Workshops & Presentations			4,288.5
Youth Event Sponsorships	Event Sponsorships	2	3.0
Total Youth Event Sponsorships			3.0
Enhanced Engagement (Gamification)	Blue Planet Foundation Microsite	1,000	8,292.0
	Interactive Gamification		1,741.0
Total Enhanced Engagement			10,033.0
Transformational Videos	"Hawai'i Energized" Episodes	10	10.0
Total Transformational Videos			10.0
Professional Development & Technical Training			
Clean Energy Ally Support & Training	Clean Energy Ally Support & Training	8,370	327.25
Targeted Ally Training Opportunities	Energy Efficiency Financing Training		58.5
	Impact of Maintenance Training		42.5
Targeted Participant Trainings	Program Trainings (Sector-Specific)		2269.0
	Building Operator Certification (BOC©)		2072.0
	Sector-Specific Conference Presentations		1313.41
	Commercial Kitchen Efficiency Training		99.0
	Green Realtor Designation		1406.0
	Hawai'i Energy Innovation Symposium		1584.0
Educator Training & Grants	ENGIE Teacher Training		723.0
Energy Industry Workforce Development	Hawai'i Energy Internship		461.5
	Energy Workforce Development Support		106.0
Total Professional Development & Technical Training			10,162.16
Energy In Decision-Making			
Strategic Energy Management (SEM)	Continuous Energy Improvement (CEI) Program	2	15
Community Based Energy Efficiency	Pūlama Lāna'i partnership	1	1
Codes and Standards			
Codes Identification and Adoption	Advocacy Events	9	14
Code-Related Training & Compliance	AIA Design Symposium Seminar/Workshop	70	141.0
Leading Edge Technologies and Strategies	Energy Efficiency Codes Coordination Subcommittee Meetings	4/1	4/1
Standards Enhancements	Appliance Standards Engagements	3	7
Clean Energy Collaboration			
IDSM pilot project		1	1

Behavior Change

The Program employs a multi-faceted approach to affect positive behavior change with Hawaiʻi residents and businesses, conveying innovative and creative messaging to help people make informed decisions about energy consumption. The behavior change focus area defined activity-based outcomes through 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 (e.g., a qualifying workshop with 20 attendees that lasted 2 hours would yield 40 participant hours). The goals for all behavior change activities were attained and surpassed through community and student workshops, and sponsorships of community events, and community-based energy efficiency initiatives.

Workshops and Presentations

Community Workshops

The community workshops delivered energy literacy educational outreach efforts to underserved, hard-to-reach communities and are foundational to the behavior change focus area. The workshops, which encompass efficiency and conservation topics, target "hard-to-reach" residential ratepayers which traditionally make up the underserved communities in Hawaiʻi, Honolulu, and Maui counties. These workshops are designed to promote the Hawaiʻi Energy message, empower community members to learn how to reduce their energy consumption, and inform them about the incentives of the Program.

Hawaiʻi Energy provides community workshops to "hard-to-reach" communities of senior citizens.

In PY18, Hawaiʻi Energy efficiency educators, comprising local community leaders, utilized multiple styles to deliver approximately 112 workshops designed to provide hard-to-reach community participants with practical ways to lower their monthly energy bills. They were facilitated by local instructors with strong community relationships. The Program targeted 2,500 behavior change participant hours during the program year and achieved a total of 2,865 participant hours. These instructors included energy efficiency concepts from the *Sharing the Aloha* series, the *Energy Unplugged* series, and workshops conducted by the team at the Blue Planet Foundation.

Sharing the Aloha

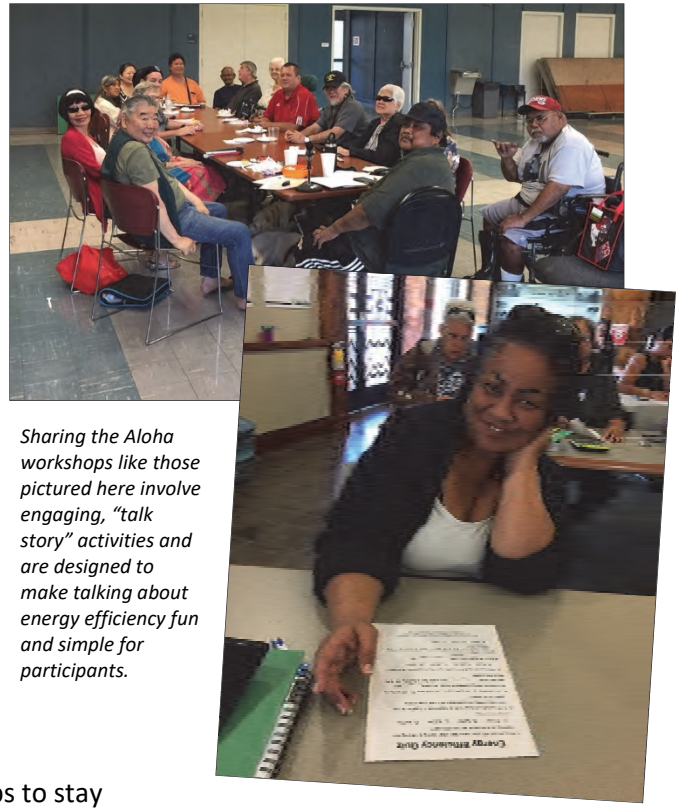
The "talk story" format of *Sharing the Aloha* community workshops remains popular in hard-to-reach communities. The workshops present energy efficiency concepts combined with personal finance guidance in a more user-friendly way that participants can apply in an everyday setting. The majority of *Sharing the Aloha* workshops were delivered on Oʻahu and Maui in hard-to-reach communities, focusing on social service constituencies and native Hawaiian community groups. Notable presentations include:

- The Hui Kūpuna VIP group on Oʻahu serves the blind and visually impaired age 55 and older. This interactive workshop addressed questions about energy saving options as a tenant versus building owner and how to efficiently ventilate a home, and included a discussion on battery storage coupled with solar photovoltaic system. This was the first time Hawaiʻi Energy presented to a visually impaired audience.
- A workshop was delivered as a requirement by the Department of Hawaiian Homelands (DHHL) for waitlisted home lessees. The DHHL requested a workshop for prospective tenants to learn about energy and financial literacy topics. Attendees engaged in discussion and debate regarding the

pros and cons surrounding energy efficiency. One resident remarked, "Being aware of unplugging certain appliances. Proud having been educated the right way. Knowledge is power."

- The Ke Ola Pono No Nā Kūpuna Program, a program that provides educational opportunities to individuals age 60 years and older of Native Hawaiian ancestry, hosted energy literacy workshops. Attendees were grateful to learn about the numerous ways to reduce energy use because the majority pay the family's electric bill from a fixed income.

- At he Kaunoa Maui Seniors program, Honolulu Community Action Program (HCAP) Waiʻanae Low Income Energy Assistance (LIHEAP) Program, and Hawaiʻi Public Housing Authority (HPHA) Waipahu 1 Project, many participants live in multi-generational households. A major discussion topic was how water heaters impact electricity cost and the benefit of recycling old and inefficient freezers, and attendees with electric bills under $100 shared ways to save money with other attendees during the "talk story" portion of the workshops.



Sharing the Aloha workshops like those pictured here involve engaging, "talk story" activities and are designed to make talking about energy efficiency fun and simple for participants.

Energy Unplugged

Energy Unplugged energy literacy workshops transform participants into energy entrepreneurs, teaching practical ways to put money back in their pockets by changing old habits into new energy-saving habits. Workshops allow participants to view energy from a financial perspective and play on the idea creating of additional 'energy income,' by saving energy in practical ways for discretionary purchases. This year, we updated the "Top Ten" list of energy habits of an energy entrepreneur to include a game console, advanced power strip, and water conservation tips to stay relevant to participants. Highlights from the program year included the following:

- Energy Literacy workshops took place on Maui to communities in Kahului, Kaunoa Upcountry, and Kīhei on Maui. Participants collectively shared experiences regarding the high cost of energy waste in multi-generational households. Attendees in Kaunoa Upcountry, Maui commented that local retailers were just meeting customer demand for the LED promotions. The workshop leader provided additional energy-reducing solutions like taking shorter and cooler showers, air-drying laundry, rotating ceiling fans to spin counter-clockwise, and using a dishwasher instead of washing dishes by hand.

- Kalani Gardens, a low-income housing complex in Mililani, where many parents attended the workshop and shared that their children use the most energy in the household. Many of the adults expressed their desire that younger family members share in energy conserving behavior. Similarly, at other times during presentation, the children reciprocated by keeping the adults accountable for wasteful actions.

- At the Oʻahu's Villages of Moaʻeku, tenants were interested in Hawaiʻi Energy's air conditioner rebates, as well as suggestions to stay cool in the summer. There was also a younger demographic interested in video games and attendees who were surprised to hear the high energy use of gaming consoles, especially when streaming movies and foregoing software product updates. The resident manager wrapped up the family night event and workshop by purchasing an advanced power strip to give away in a raffle at the next family night.

Blue Planet Foundation

The Blue Planet Foundation contributed lively and engaging workshops that explored concepts of climate change in addition to energy conservation. In PY18, Blue Planet Foundation provided workshops to communities throughout the state, including employees of large businesses, hotels, residents with limited knowledge of Hawaii Energy programs or energy efficiency, residents with limited access to efficiency improvements or lacking the ability to make energy efficiency changes (e.g., low-income customers, those who speak English as a second language, renters, and geographically-isolated residents). Highlights from the program year included the following:

- Management at the Ka‘anapali Beach Aston Whaler Hotel supported a coordinated effort with hotel staff to attend Blue Planet Foundation’s onsite energy efficiency workshop. The workshop was an important learning opportunity for employees normally unable to attend such events due to busy schedules. Valet, housekeeping, and kitchen staff participated in trivia games about Hawai‘i Energy, solar water heaters, LED light bulbs, and the “Rid-A-Fridge” program. The event emphasized the importance for broader messaging to the neighbor islands with employees commenting that they were previously unfamiliar with Hawai‘i Energy’s offerings in Maui.

- At a community engagement workshops at UH Mānoa, Blue Planet Foundation inspired graduate students to immediately change the rotation of classroom fans during an energy efficiency presentation to reduce university power usage. Students also learned about the importance of preventative maintenance for maintaining a solar water heating system to improve performance and energy efficiency.

- Energy efficiency education staff from Blue Planet Foundation delivered a community energy efficiency presentation at the Hanauma Bay Visitor’s Center. Senior citizens and local families gathered at the Center to learn about energy efficiency in relation to climate change. Following the presentation, attendees discussed how to reduce energy use and decrease climate change through behavior change.

Attendees discuss Hawai‘i’s 100% clean energy goals at Hanauma Bay Visitor’s Center (L) and Maui residents learn how to access Hawai‘i Energy’s programs and incentives. (R)

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.

Hawaiʻi Energy introduced the Continuous Energy Improvement (CEI) program with supplemental workshops highlighted below for select cohort participants:

- *Hawaiʻi Gas:* The audience at this CEI presentation comprised of Hawaii Gas field workers, a tight-knit group that practiced peer influencing behavior to use only refrigerator, reduce gaming, and shorten showers. They were very engaged and held each other accountable during the presentation.
- *Architects Hawaiʻi:* This group works daily with building construction and design and was very familiar with many of the concepts, terms and products that the training touched upon. Program representatives highlighted the business programs which included a call to action to utilize commercial incentives, as well as covering the residential program which impacts them as individuals at home. As potential messengers and influencers, it was a key audience to share the broader scope of Hawaiʻi Energy's programs.
- *Children's Discovery Center:* The employees learned more about what was happening with the EmPOWER nonprofit program and how it impacted the Center's energy bill. The workshop continued to carry the energy efficiency message and focused on what employees could do in their homes to conserve energy. The group appreciated Hawaii Energy's efforts to create change not only in their workplace but also in their homes. Employees spoke of the possibility of creating energy efficiency education for the youth at the Center.
- *Hawaiian Airlines:* Concluding the workshop series from the CEI cohort, Hawaiian Airline employees were excited to answer trivia questions about energy efficiency, such as the proper blade rotation on a fan, what goes into the ENERGY STAR® certification for appliances, the amount of energy saved annually with a LED light bulb, and if a dishwasher is more efficient that washing dishes by hand.

Hawaiʻi Energy leveraged its community education expertise to further engage with CEI participants by hosting sessions for employees to learn about energy-saving practices for the office.

Aloha United Way

Hawaiʻi Energy coordinated with Aloha United Way (AUW) to join efforts towards assisting the ALICE® population and the organizations that serve their communities. At the start of PY18, Hawaiʻi Energy met with AUW to identify ways Hawaiʻi Energy could reach customers through AUW's in-house 211 information hotline for social services and utility bill assistance. These customers face utility issues, such as final disconnection notices, high account setup deposits for families moving into Section 8 housing, and general financial hardship to pay the electric bill. Hawaiʻi Energy, after meeting with AUW's 211 call

center team, identified methods of helping residents reduce their utility bill after receiving emergency financial assistance and equipped the call center team with program information and resources to share with clients. Hawaiʻi Energy followed up the initial collaboration with Aloha United Way with an *Energy Unplugged* workshop and provided Home Energy Kits for each member of the 211 call center team which included LED light bulbs and faucet aerators.

During one of the quarterly leadership meetings, Hawaiʻi Energy also provided a general overview presentation to the ten ALICE grantees, organizations receiving AUW funding to leverage their expertise in addressing the reasons behind financial vulnerability. The grantee program "calls on us [AUW] and our grantees to leverage our knowledge, skills, networks and assets to effect systems change and impact in our communities. Together, we will define goals, determine shared measurement and articulate a pathway to address the root causes of financial instability." Hawaiʻi Energy staff highlighted some of the ongoing work with the business programs and invited the grantees to listen to tailored solutions for their constituents which included literacy opportunities and retrofit services.

ReNEW Rebuild Hawaiʻi

Hawaiʻi Energy supported the Fall 2018 Renew Rebuild Hawaiʻi Forum, which focused on energy education and green jobs. Industry professionals shared information on the future of energy jobs citing design projects using the latest technology to monitor energy use at the University of Hawaiʻi, and teacher professional development opportunities in energy efficiency and STEM curriculum through the Hawaiʻi Department of Education's Ka Hei Program.

Hawaiʻi Energy also sponsored the Spring 2019 Renew Rebuild Hawai'i Forum, which brought together public- and private-sector stakeholders for discourse on statewide and Pacific-area energy projects, especially for underserved populations. Highlights from the two events included specific, innovative community solutions for energy infrastructure. A diverse selection of speakers presented on a dynamic range of topics from renewable energy for low-income rentals to an analysis of infrastructure investment spending in Hawaii.

Youth Education & Events

Hawaiʻi Energy continued a strong investment in youth audiences, preparing students and youth-based organizations with the knowledge and tools to solve future energy issues. Educational resources provided by Hawaiʻi Energy and its community affiliates explored energy and climate change concepts and included curricula based on STEM learning methodologies. The workshops touched on a variety of energy efficiency topics, complete with multimedia, video content and gamified challenges incorporating hands-on activities that help spur creativity and develop higher-level critical-thinking skills. The program achieved 1,423.5 participant-hours, exceeding the 1,000 participant-hour goal.

Hawaiʻi Energy worked teamed with the Blue Planet Foundation to work with schools and organizations around the state to deliver energy education presentations throughout the year. A modified youth version of *Energy Unplugged* was also presented to local student groups. Youth engagement efforts provided energy efficiency knowledge to students of all ages and grade levels at public, private, and charter schools. Highlights from the program year included the following:

- An *Energy Unplugged w*orkshop was delivered to a youth audience at the City and County of Honolulu's Summer Fun Program. The affordable summer program is the largest of its kind in Hawaiʻi, serving approximately 10,000 school age children each year from June to July at over 60 sites island-wide. This year, the workshop was held at Kainalu Elementary and was tailored to provide a hands-on experience for both students and teachers. They investigated energy sources at the facility and discussed which were most important and which could be reduced or even eliminated to save energy.

Students at Hawai'i Energy's "Power Down" session using the LED Hand Crank to learn the difference between a LED and incandescent lightbulb (top). Students use Kill-A-Watt™ meters to measure the power usage of a LED desk lamp during an energy efficiency exercise (bottom).

- The Place-Based After-School Literacy Support (PALS) and Place-Based Learning and Community Engagement (PLACES) programs funded through the Department of Education, Native Hawaiian Education Program and administered through the Office of Student Equity, Excellence and Diversity (SEED) at UH Mānoa invited Blue Planet Foundation to do a presentation about clean energy and energy efficiency for a small group of high-functioning special education students. This youth audience had each concept broken down to connect the relationship between energy efficiency habits and saving both money and energy. They were most intrigued by the concept of "phantom load" and the fact that even when they were not using electronic devices, the devices were still drawing energy and wasting money. Blue Planet Foundation also held a clean energy workshop at Nānākuli High School for special education students.
- Blue Planet Foundation's "#LikesForLights" campaign from PY17, which solicited votes over social media to select a school to receive a major LED retrofit, announced Haha'ione Elementary School in East Honolulu as the winner. A workshop with the third grade class further engaged students and reinforced energy-saving behavior. Students were thrilled to be selected particularly after the hand crank exercise, which physically demonstrated the lower-energy usage from LEDs compared to incandescent lightbulbs as students powered lights pedaling with their hands.
- The *Energy Unplugged* workshop presented a "Power Down" message to middle school and high school students at a Student Energy Summit. A highly engaged classroom discussion explored how the Apollo 13 spacecraft was forced to reduce its power usage to be able to return to earth, and students created a "classroom spaceship" environment to replicate the challenge. Students also used Kill-A-Watt™ meters to compare the power usage of different appliances and gauge them as essential or extraneous.
- Workshops explored the spacecraft Apollo 13 theme in three additional sessions made up of middle school students from across the state. A classroom spaceship was created where Kill-A-Watt™ meters were used to measure the power usage of 9 different appliances. The kids identified the two appliances that used the least energy as well as the appliances that drew phantom energy. Afterward, the students were encouraged to bring the lessons learned in the classroom into a home setting.

Youth Education Sponsorships

Hawai'i Energy has been committed to science, technology, engineering, and mathematics (STEM) efforts and community youth engagement initiatives. The three sponsorships this program year included: a large Aloha Council (Boy Scouts of America) event that attracted thousands of youth and families; an annual teacher and student STEM conference for public and private schools; and a community-specific sponsorship in assisting fundraising activities for a Lāna'i High and Intermediate School basketball club.

Onizuka Day of Exploration

Hawai'i Energy was a main sponsor of the 2019 Boy Scouts Ellison Onizuka Day of Exploration, which supported both transformational and marketing efforts. This traditional spring Makahiki was free to the public and featured STEM-based activities, competitions, and speaker panels that brought in a crowd of over 10,000 youth and families. The event was geared toward families with children with the goal of introducing Scouts and families to STEM. The Hawai'i Energy staff conducted two back-to-back workshops about how to make Hawai'i the national leader in energy efficiency. Scouts learned how to

make smart energy choices to reduce energy consumption through fun and interactive activities, such as an online gaming platform and the hands-on Power Grid Protector game.

Students at the annual Hawai'i STEM Conference role play as "Energy Savers" and "Energy Wasters" in the Power Grid Protector *game.*

Hawai'i STEM Conference

The 10th annual Hawai'i STEM Conference, coordinated by the Maui Economic Development Board (MEDB), attracted more than 1,000 students, teachers, parents and industry and community leaders from across the state and nation to engage in hands-on training, STEM competitions, on-site hackathons, a STEM service-learning project showcase and 5x5 career networking. The inspiration, tools and resources gained during the conference helped students and programs to design solutions to challenges in their communities. Participants took part in more than 85 breakout sessions led by 215 sponsors and industry partners and engaged in hands-on STEM activities. Additional impacts from the 2019 STEM Conference:

- 1000+ Participants from across the state of Hawai'i and U.S. Mainland including over 500 Students
- 300 Teachers participating in the Professional Development Workshop
- 12 STEM Competitions, including fast-paced 3 Hack-a-thons focused on Hawai'i's cultural and environmental significance

Hawai'i Energy staff co-presented with 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.

A teacher at Pukalani Elementary School summarized the importance of the learning experienced at the conference, saying: "A lot of things that we learned during this conference are helping us move in the right direction. We're preparing our students for the technologies that are coming out and encouraging them to become creative thinkers and innovators, because they will have a lot of problems that need solving in this world – climate change, automation, artificial intelligence, just to name a few."

Scouts and their families engage in in various demonstrations and games at the Hawai'i Energy booth at the annual Onizuka Day of Exploration.

Hala Kahiki Basketball Club, Lāna'i

Hawai'i Energy sponsored the Hala Kahiki Youth Basketball Club, a community-affiliated nonprofit of Pūlama Lāna'i that assisted in Hawai'i Energy's Fridge Swap Hui event. The event provided the opportunity for the Club to support the replacement and recycling of refrigerators throughout the community of Lāna'i. The Hala Kahiki Club members attended an energy literacy workshop, subsequently performed home energy audits at each Fridge Swap Hui participant's home while the refrigerator removal and installation occurred, shared energy saving recommendations, and gained career insight and real-world experience in the energy industry.

Energy Unplugged conducted a workshop session with the team to supplement the activities with the Club and Fridge Swap Hui. Two of the basketball team members were particularly interested in the gaming tip and were surprised at the amount of energy the consoles use. The team really understood the high cost of living on their island and the stress that utility costs can present to the residents.

Enhanced Engagement & Gamification

Enhanced engagement strategies create better interactions with customers, keeping people interested in energy efficiency concepts, reinforcing behavior change efforts and creating other opportunities to engage with the Program. When executed effectively, enhanced engagement practices, such as the gamification of energy efficiency and conservation concepts in a micro-website platform and/or development of interactive tabling displays, motivate participants while creating "sticky," lasting behavior change and establishing a shared sense of purpose in reaching a common goal. The program helped influence real-world actions to reduce energy use and provided a communication pathway for multiple interactions between the customer and the Program.

In PY18, enhanced engagement activities reached over 10,000 participants, with program activities designed to build audiences and create deeper interactions to effect long-lasting or permanent change in a resident's energy choices. Blue Planet Foundation used enhanced interactive presentations, digital efficiency trivia, a virtual spin-the-wheel game, the Power Grid Protector (PGP) game, A to Z game cards, and trivia events to accomplish enhanced engagement and gamification metrics. The *efficiencyunlocked.org* microsite developed from the previous program year was also utilized in engagement activities. Highlights from the program year included the following:

- *Annual Girl Scouts of Hawaiʻi STEM Fair* - Blue Planet Foundation discussed energy efficiency with Girl Scouts and their families while they took turns playing with the Power Grid Protectors game and using the LED Hand Crank demonstration, both of which illustrated the electrical and physical energy required to light up a LED bulb versus an old incandescent one. The Scouts explored the *Energy Unlocked* microsite in real-time and took home Hawaiʻi Energy *Tips and Tricks* booklets to share with friends and family.
- *Keiki Fest Maui* - The Annual Keiki Fest Event takes place on the Great Lawn of the University of Hawaiʻi Maui College. A diverse group of Maui's nonprofit agencies organized the event to support a sustainable and clean environment for Hawaiʻi's youth. Blue Planet Foundation engaged attendees with energy efficiency games and activities, such as energy trivia, a spin-the-wheel game with competitions for both parents and children, and a discussion regarding energy efficiency practices at home that can reduce energy consumption.
- Blue Planet Foundation focused on energy efficiency enhanced engagement and gamification with students from Punahou School, Moanalua Elementary, Kaʻohao Elementary, Le Jardin Academy, and Kamilo'iki Elementary. Fourth and fifth graders rotated through activity stations, (e.g., LED Hand Crank demonstration, Power Grid Protector game, and A to Z game cards) and were asked to share their experiences from those activities.

The LED Hank Crank was the most popular game at this year's Girl Scouts of Hawaiʻi STEM Fair.

- Two energy efficiency trivia events for adults took place on Oʻahu and Maui in PY18. Self-organized teams competed against each other on their energy trivia acumen. Questions like, "What day of the year is the least amount of energy used in the United States?" encouraged the participants to make better energy choices and reduce energy consumption. The event's success led to a similar trivia night hosted on Maui.

Efficiency Unlocked Microsite

In collaboration with Blue Planet Foundation, the *efficiencyunlocked.org* microsite was updated from the prior program year to educate, entertain and nudge customers toward finding cost-effective or free ways to reduce energy consumption in their home. By definition, a microsite is an auxiliary website designed to live separately from a main website to address a specific concept or need. The user interface was streamlined and simplified to allow easier navigation through the virtual rooms. Customers toured the microsite with their virtual hosts, Pluggy (Hawaiʻi Energy's mascot) and Keoni (the microsite's animated co-host), into a gaming environment to play various levels and to choose items in a house that reduce energy use. At the end of the experience, the customers subscribed to Hawaiʻi Energy's customer mailing list and entered to win a grand prize. The microsite utilized gamification to teach energy efficiency concepts and increase awareness of the role of energy efficiency in our journey to Hawaiʻi's 100% clean energy goal by the year 2045.

Those who visited the microsite and entered the contest were eligible to win fun prizes, like the items above.

The microsite was used in classrooms, at events, and even at professional development training sessions. Its effectiveness was measured based on the number of individuals that participated in the challenges and competitions of the site. The total number of participants viewing at least one microsite virtual "room" was 8,292, well exceeding the performance goal of 500 participants. The significant participation was attributed to the Hawai'i Energy and Blue Planet Foundation messaging campaigns and an end-of-year contest promoted through online platforms, e-newsletters, and tabling events.

Transformational Videos

Hawaiʻi: 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. Hawaiʻi Energy's web video series, *Hawaiʻi: Energized!*, made its way onto the local lifestyle show *Living808* on KHON2. These webisodes are geared to help consumers learn more about saving energy and money. Some of the topics included:

- A game called "The Shocking Truth" played with *Living808* hosts in order to test knowledge about various energy habits
- Popular electric gifts for the holidays and whether they are energy-efficient or energy wasters
- Show hosts playing a "Pictionary"-like quick-draw game so that viewers could play along and learn how the items depicted in the answers can save energy and money
- A visit to Refrigerant Recycling Inc. to learn more about how refrigerators collected through the trade-in program are recycled in an environmentally-friendly manner
- How to be more energy efficient during the peak heat of summer months and the amount of money that can be saved along the way

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. For more on *Hawaiʻi: Energized!*, see the Marketing & Communications section.

Professional Development

Professional development offerings target those who are in positions of influence to affect energy decisions in homes and businesses. These include building operations and engineering staff, architects and designers, 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 hundreds of energy professionals. This activity area also includes energy-industry workforce development, including 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 10,462 hours across activity categories.

For details on professional development and training as it pertains to Clean Energy Allies (CEAs), please refer to the Clean Energy Ally section.

An energy literacy professional development exercise at Mid-Pacific Kupu Hou Academy.

Educator Training and Grants

Accredited Educator Training

Hawaiʻi Energy worked with ENGIE Services to provide educator training through the accredited Department of Education (DOE) "Professional Development: Educate, Empower, Excel" (PDE3) three-credit courses titled, *Teaching Energy with Science, Technology, Engineering, Art, and Mathematics* (STEAM), that engaged K-12 teachers in energy efficiency curriculum across the state of Hawaiʻi. The PD course hosts inquiry-based learning experiences that translate directly back into the classroom and equip teachers with the resources, knowledge, and skills to teach about energy efficiency and Hawai'i's energy issues. The course supports the implementation of relevant, real-world energy education, and develops teachers' ability to incorporate STEAM pedagogy into the classroom. The courses targeted Hawaii County and Honolulu County educators this year.

Two DOE workshops courses were conducted in Kailua-Kona and Hilo over spring break through the approved PDE3 system. The two-day courses covered group discussions and activities focused on teaching methods surrounding weather vs. climate, Next Generation Science Standards (NGSS), climate change, ocean acidification, and how energy efficiency changes the carbon footprint. Following the in-class instruction, teachers were required to attend webinars for guidance on portfolios that were incorporated into a classroom curriculum. Portfolio submissions to the DOE explored solar circuitry, lighting investigations, climate change & carbon footprints, and natural resource scarcity.

Multiple Hawaiʻi Energy learning tools were presented, such as the Hawaiʻi Energy microsite as a platform to help residents manage their energy use. As the discussion on the microsite continued, one teacher noted that the concepts learned on the microsite can be translated directly into classroom projects. Also, critical thinking activities were based around the relationships between climate change and reducing the use of fossil fuels through efficiency.

"I think it is essential that we as educators are introducing concepts of climate change, resource use, and energy efficiency to our students, as they will be the ones facing increasing challenges related to these concepts in the future. I am grateful to have the resources provided through the Teaching Energy with STEAM PD course to help facilitate this teaching; I now feel more comfortable with instruction of these topics than I did before." – Upper Elementary Teacher, Hawai'i Technology Academy

"Initially, I signed up for this class with the hopes of learning some new things about teaching students about energy through hands-on experiences. That was it. I had no idea how much learning would take place and the way it would impact my own teaching styles. I now let the students explore with tools, equipment and the written part of the lesson. If they have some idea of how to improve what is being taught, I make the changes to accommodate what they are suggesting improving the lesson for them and I then adjust my overall lesson at the end for the next time I teach the lesson. This gives my students a sense of ownership for their learning, it helps me to better know what they need in their learning process and helps the overall lesson improve." – 5th Grade Teacher, Kea'au Elementary

Another energy literacy professional development workshop was delivered to teachers hosted by the Mid-Pacific Kupu Hou Academy on the Kamehameha Maui Campus. The Kupu Hou Academy serves teachers from public, private and charter schools who use the cohort to develop professional learning tools in the context of new technology. "The Kupu Hou experience revitalizes what is most rewarding about being an educator," shared one Hawaii Technology Academy middle school teacher and Kupu Hou participant. "The push to connect with real-life, solution-based work and to align this work with community partners, has forced my team to think creatively, work collaboratively, and reflect along the way about what makes us tick, personally and professionally."

Targeted Technical Training Opportunities

Building Operator Certification (BOC©)

The Northeast Energy Efficiency Council's (NEEC) Building Operator Certification (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 building scoping for operational improvement. Designed for facilities maintenance and engineering professionals from early career to management level, this 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 (SLIM) and UH Mānoa Outreach College to sponsor BOC® Level I and II and Level I courses, respectively. In all, 31 students registered for and successfully completed the courses (21 from O'ahu and 10 from Maui County).

The BOC Course utilized leading-edge distance learning technology to reach more audiences across several islands.

For the second year, the BOC® course was offered via ZOOM web conferencing, giving busy working professionals an online learning option for better access in remote locations. It also allowed the Outreach College to better leverage its pool of instructors and save on travel costs. The cohorts who have applied to receive the Hawaiʻi Energy tuition subsidy 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.

"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."

Lighting Training at UH Maui

This full-day course was developed to supplement the efficient lighting module of the Building Operator Certification (BOC®). 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, and the impact of lighting on mood and health, and it 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. Ten 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.

Illuminating Engineering Society (IES) Lighting Training

Hawaiʻi Energy joined the Hawaiʻi Chapter of IES, the State Department of Business, Economic Development, and Tourism (DBEDT) and Hawaiian Electric Company to present an intensive, hands-on course on Solid State Lighting Design and Controls aimed at architects and design professionals. The full-day workshop in Honolulu focused on strategies to comply with the IECC 2015 energy code, daylight harvesting, zoning, and exterior lighting, lighting calculation software, and how to use cutoff lighting to comply with dark sky ordinances. The afternoon was devoted to a hands-on discussion of networked lighting control (NLC) systems, which are quickly becoming industry standards. Nationally recognized lighting expert and consultant Steven Mesh, LC, IESNA, presented the course.

HLTA Green Hotel Forum

Hawaiʻi Energy supported the Hawaii Lodging & Tourism Association's Engineers Advisory Council's annual Green Hotel Forum in January at the Kahala Hotel. This annual event organized by the State DBEDT brought together diverse professionals from hotel management, maintenance staff, and

sustainability teams to share green initiatives including: energy and water conservation, recycling, composting, pollution prevention, cultural engagement, and energy efficiency retrofits. This event was well attended by 46 attendees and industry consultants.

Practical Energy Management

A *Practical Energy Management for Buildings* course was held in partnership with University of Hawaiʻi (UH) Mānoa Outreach College. Building and facilities managers, consultants and energy industry staff learned about how to create an energy plan and present it to management with financial analysis. Attendees also reviewed the fundamental building systems that can be retrofitted for greater efficiency and savings and learned how to troubleshoot those systems, operate their equipment effectively to save energy, and conduct building energy assessments and benchmarking.

The Practical Energy Management class focused on real-world problems encountered in facility operations and featured small group breakout activities where members role-played how to pitch energy improvements to management.

Commercial Kitchen Training

Hawaiʻi Energy sponsored a training event for more than 18 culinary arts students and professionals from the restaurant community, focused on energy and money-saving technologies and practices in commercial kitchens. Students learned the fundamentals of energy efficiency in food service, did a walk-through and audit of a test kitchen, and completed hands-on exercises to understand how upgrading to newer, more efficient equipment could benefit their business and bottom line while helping the environment.

Net Zero and Codes Seminar

Hawaiʻi Energy provided support for U.S. Green Building Council (USGBC), Hawaiʻi Chapter's Build and Buy Green conference, by helping bring a nationally-recognized energy efficiency expert from the New Buildings Institute to give a keynote speech on climate, energy, codes and getting to net zero energy. The Program also presented its efforts in the counties' adoption of the newest energy code, and its Rapid Response offerings on Hawaiʻi island. Over 80 professionals from all counties attended the event.

Groups of architects, engineers and contractors discussed real-world challenges to going beyond code, as well as potential solutions at the Net Zero and Codes Seminar.

Hawaiʻi Buildings Facilities and Property Management Expo

Energy advisors presented at the Hawaiʻi Buildings, Facilities & Property Management Expo, as part of a seminar called, "Going Green to Save Green" sponsored by the Community Association Institute (CAI) of Hawaiʻi. This seminar was attended by a total of over 200 Board Members, Resident Managers, Property Managers, and associated organizations. Attendees were able to gather actionable takeaways about relevant energy efficiency projects to the sector, contractor insights, Hawaiʻi Energy incentives and programs, and updates about EV charging stations.

Sustainability Leadership participants on a site tour at the Hyatt Regency Maui

Hawaiʻi State Association of Counties

In June, Executive Director Brian Kealoha participated in a panel for an audience of over sixty county elected officials and staff at the Hawaiʻi State Association of Counties (HSAC) annual conference, held in Wailea, Maui. The presentation, part of a track on affordable housing, gave an overview of Hawaiʻi Energy's partnerships with the counties and energy code outreach, its three-year plan objectives

regarding accessibility and affordability, and focused on the critical importance of energy efficiency in lessening Hawai‘i households’ high energy burden (percent of income spent on electricity) and keeping homes affordable over time.

NEW: Sustainability Leadership

The Sustainable Living Institute of Maui (SLIM) at UH Maui College provided a Sustainability Leadership course in Spring 2019.

The course covered sustainability frameworks, benchmarking systems and strategies for improving energy efficiency and more effective resource management at organizations by applying sustainability principles as organizational leaders. The 16-hour training was organized into two cohorts due to higher-than-anticipated demand, with enrollment coming from a wide range of sectors and industries including the visitor/hospitality industry, natural resource management, agriculture, retail, real estate, government and education. One participant commented in her evaluation: “*Every business should send employees to this class. It gives you the tools to care for our precious island resources and to save money, too.”*

NEW: Green Realtor / NAR Green Designation

Hawai‘i Energy hosted a new two-day workshop on “green real estate” principles for 20 licensed Maui real estate professionals. The training earned them the National Association of Realtors Green Designation. The course was taught by an experienced instructor from California nonprofit Build It Green who is both a homebuilder and realtor. It empowered attendees with valuable knowledge about the many benefits of an energy- and resource-efficient home. Several guest speakers customized the content to Maui’s unique market and conditions and gave participants a big-picture view of the county’s and state’s clean energy goals, and how they can use their Green Designation to be part of this transformation. The class was so enthusiastic about their newfound skillset that they formed an ad-hoc “green committee” to continue learning about energy and sustainability to support each other.

Real estate agents learned about how to identify, market and advice clients about energy and resource-efficient homes.

Targeted Ally Training

NEW: Impact of Maintenance on Energy Efficiency

The Program co-sponsored a new training course for trade allies, building operators and engineers. Organized by the Association of Energy Engineers (AEE) Hawai‘i Chapter, the training, “The Importance of Maintenance on Energy Efficiency Project Equipment,” covered the necessity of ongoing maintenance on HVAC systems to keep equipment running optimally and efficiently. Photovoltaics, domestic hot water system maintenance and continuous commissioning were also covered. Attendees learned how to plan and budget for proper maintenance programs for their upcoming energy projects.

Energy Industry Workforce Development and Vocational Training

Hawai`i Energy Fellowship Program

The Program was fortunate to have a summer intern furnished through the National Association of Regulated Utility Commissioners (NARUC). This ten-week program was designed to expose a college student to a real-life work environment in the field of energy, where he or she could build professional and technical skills and support key activities within the host organization. This year’s intern, a highly capable engineering student from Princeton University, showed outstanding aptitude and commitment to the Program’s mission. He assisted with research on energy efficient technologies and measures (e.g., transformers, cool roofs, window films, air purifiers, and grid-interactive water heaters), performed modeling related to weatherization, assisted with

commercial account data analysis, created tools for customers to estimate savings and rebates for the Transformers incentive, and provided support for the Program's Energy Advisors in their projects. The intern summarized his experience this way: "I enjoyed my internship with Hawai'i Energy very much because it gave me great exposure to the world of energy efficiency and the energy scene in Hawai'i. I want to go into the energy field in Hawai'i after I graduate. In this internship I did a lot of data analysis, which was something I wasn't generally interested in before, but I think it was a very useful skill to develop. I think the best part of the work I did was that it was diverse and allowed me to explore different applications in energy."

Upward Bound at Windward Community College

Students from Windward Community College's Upward Bound skills mentorship program visited Hawai'i Energy as part of a STEM-focused, problem-based learning project. The students were from low-income and at-risk backgrounds or were first-generation college students researching how Hawai'i can best achieve its 100% clean energy goals, while also exploring diverse careers in science, technology, math and engineering. Two Hawai'i Energy staff members shared the educational and professional paths that led to their current position, and the students had the opportunity to ask insightful technical questions for their project during a Q&A period.

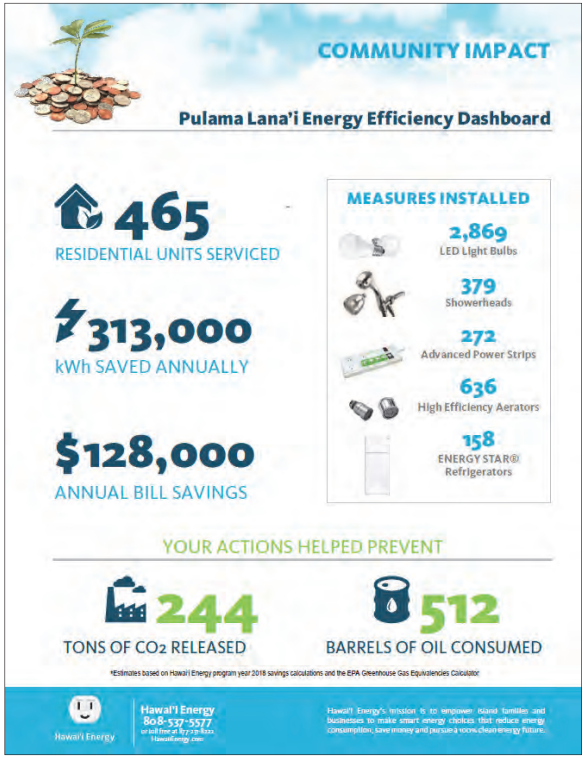
Energy in Decision-Making

Community-Based Energy Efficiency

Hawai'i Energy initiated a Community-Based Energy Efficiency (CBEE) program at the start of PY18 to be holistic in addressing the needs of communities and recognizing the equity obligation to provide access to energy efficiency resources to all islands and demographic groups. The island of Lāna'i, comprised of approximately 3,000 residents, was identified as a unique community that faced many challenges surrounding the lack of energy efficiency resources and at the same time, because of its ownership structure and small size, one with many opportunities to make significant impact in this area.

In 2012, entrepreneur Larry Ellison purchased the island of Lāna'i and created Pūlama Lāna'i, a resource management company, with the mission to create, manage, preserve, and protect the island's natural resources. Hawai'i Energy recognized their goals as an opportunity to collaborate with and offer Pūlama Lāna'i an integrated suite of energy efficiency solutions. The engagement was formalized through a non-binding participation agreement with Hawai'i Energy to collaborate comprehensive resource acquisition measures and transformational programs from both the Residential and Business portfolio.

The Hawai'i Energy team kicked off the effort by listening to Pūlama Lāna'i's needs and evaluating potential opportunities. The initial engagement resulted in the near-term implementation of Residential energy efficiency services. Business offerings are slated for implementation in the next program year. Two multi-family properties, Iwiole Hale and Kānepu'u (over 200 single-family residences) were identified to have multiple potential pathways for benefitting low- to moderate-income residents. The services implemented during this CBEE engagement included the following:



1. *Bulk ENERGY STAR® refrigerator replacement at the Iwiole multi-family property with the recycling and proper disposal of old, working refrigerators.* Hawai‘i Energy worked with the local supply chain to offer the best pricing for 18 cubic-foot refrigerators and contributed resources for shipping, delivery, and installation to provide a turn-key, white-glove service to the residents.

Replacing old refrigerators with efficient models at the Marketplace in Dole Park.

2. *In-unit multi-family and single-family retrofits, including LED lightbulb, low-flow showerheads, kitchen and bathroom aerators and advanced power strip replacements for each residential unit.* The retrofits were completed at Iwiole and Kānepu‘u multi-family properties, as well as over 200 single-family residences.

3. *Providing energy literacy workshops where residents would learn about additional ways to save money on their electric bill.* A workshop was presented at April’s monthly community meeting at Lāna‘i’s International Longshore and Warehouse Union (ILWU) building in the center of town. Also featured were mini energy-literacy sessions held during the community fridge-swap event at the central town park.

Separate from the Pūlama Lāna‘i engagement, Hawai‘i Energy initiated a community-based effort to provide energy efficiency resources to Lāna‘i’s overall residential community. Lāna‘i residents participated in Hawaii Energy’s first *Fridge Swap Hui* at the main town park, replacing their old working fridge for a new ENERGY STAR® energy efficient models. Hawai‘i Energy also enlisted help from the local Hala Kahiki Boys Basketball Club who provided outreach and support during the event (refer to the RHTR section for further details).

Continuous Energy Improvement (CEI)

In PY18, Hawai’i Energy continued its CEI pilot program to provide data-based support and continual guidance to larger organizations and companies to effect ongoing improvements in their energy management processes. The CEI program focused on capital improvements, operational changes and behavior change opportunities, all of which are synergistically linked to other Hawai‘i Energy incentive programs and transformational training/education offerings. CEI helps companies and nonprofits save money on operational costs, engage employees in energy-saving efforts, and fulfill their environmental stewardship and corporate responsibility goals.

A key expansion of CEI in PY18 was the collaboration with Hawai‘i Green Growth (HGG) which coordinates the Sustainable Business Forum (SBF), a collective of fourteen (and still growing) businesses that meet at the executive level to advance Hawai‘i’s sustainability goals. Towards the end of PY17, HGG, in pursuit of quantifying measurable progress towards its Aloha+ Challenge goals, collaborated with Hawai‘i Energy recognizing energy efficiency was the first step of the six areas which comprise the Aloha+ Challenge goal and its natural fit with Hawai‘i Energy’s existing CEI program.

With this partnership, the CEI program quickly swelled from a handful of organizations in the previous program year to more than a dozen. In order to engage with such an increased number of participants, the CEI program evolved, becoming more streamlined to address unique participant facility characteristics and limited staffing capacity. With the growing number of participants and types of buildings, Hawai‘i Energy decided not to fund an external grant but recognized the need to devote an in-house full-time position to the CEI program. A full-time Energy Advisor with experience in institutional energy management was brought onboard near the end of the program year as the CEI program’s enhanced parameters and goals and increased value to

customers became clearer, along with the need for more staffing support. With a handful of exceptions, the majority of this year's participants owned or occupied office type buildings, with five SBF members being tenants in larger commercial office buildings.

The SBF members who participated in CEI are:

- Alexander & Baldwin
- Architects Hawaiʻi Ltd.
- Harold K.L. Castle Foundation
- Hawaiian Airlines
- Hawaiian Electric Co. (Koʻolau Baseyard facility only)
- Hawaiʻi Community Foundation
- Hawaiʻi Gas
- Hawaiʻi Pacific University
- Kamehameha Schools
- Pineapple Tweed
- Pūlama Lānaʻi (Oʻahu, Lānaʻi)
- The MacNaughton Group
- Ulupono Initiative

The CEI program was customized for each participant since organizations faced opportunities and barriers unique to their operational and behavioral environment.

Streamlined Framework

Working with the SBF members, Hawai`i Energy staff quickly identified several crucial details that would make CEI program participation different from previous pilots. For some participants, challenges were identified, such as the lack of regularly tracked variables that would correlate strongly with energy use and the inability to carry out energy efficiency projects due to issues with building ownership and owner-tenant agreements. Also, energy efficiency opportunities are limited in office spaces as opposed to the more customary industrial or manufacturing type facility. Throughout the program, it was defined that institutions that have the following characteristics were more suitable for the CEI program:

- Diverse and competing priorities (including energy management)
- Organizational readiness, leadership buy-in to incorporate CEI
- Experience with continuous improvement
- Some initial capability to measure energy reduction

Hawaiian Airlines and Kamehameha Schools met the above criteria. Each educational institution identified a Sustainability Manager as a point of contact for communication to provide useful insight and feedback throughout the program. The dedicated POC helped facilitate greater levels of engagement and will lead to continued conversations around energy efficiency projects and opportunities at these facilities.

Collaboration + SBF Data Dashboard

Hawai'i Energy worked with Hawaiʻi Green Growth on reporting metrics based off of the results from the engagement with the CEI participating organizations throughout the year. These metrics are also provided on the SBF online dashboard when publicly available, reflecting the percent change in energy use, energy use intensity, and the equivalent tons of CO_2 emissions avoided.

There was also a greater focus on employee engagement than in the previous Program year in order to drive deeper organizational effort, as national research on successful CEI programs has found that employee engagement and behavioral change is essential. Hawaiʻi Energy worked with partners to

educate employees on common ways to save energy at work and at home. Participants of the program were also given a CEI opportunity list outlining low-cost opportunities grouped into three categories: capital improvements, operational changes and behavior change opportunities.

Codes and Standards

County Adoption of 2015 IECC Support

Following the enactment of IECC 2015 at the state level, 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 Hawaiʻi-specific amendments, and make further county-specific amendments, as long as they do not weaken the provisions. Kauaʻi was the first county to adopt the new building energy code with amendments on November 30, 2018. Maui County was next with its County Council adopting their version on March 22, 2019. As of this writing, the City and County of Honolulu was deliberating key amendments which include electric vehicle provisions and residential solar hot water requirements.

Community Outreach and Advocacy of Codes, Zero Net Energy for New Construction

In November, in partnership with the Hawaiʻi State Energy Office (a division of the state Department of Business, Economic Development, and Tourism), the Program sponsored an hour-long technical training on the most critical changes contained in the new code, both in the commercial and residential provisions. The initial session focused specifically on: the benefits of new code for energy efficiency, indoor air quality, occupant comfort and increasing energy resilience; and providing a comparison of the different tools available by different organizations, such as New Building Institute's Zero Energy Performance Index (zEPI) tool, U.S. Green Building Council's Leadership in Energy and Environmental Design, American Society of Heating, Refrigeration and Air conditioning Engineers Standard 189 and Architecture 2030's Zero Tool. This workshop was featured in the "Healthy Citizens, Healthy Communities" track of the joint American Institute of Architects Pacific Northwest Annual Conference / Pacific Building Trade Expo in Honolulu and was attended by over 90 design and construction professionals. The training was followed the next day by a 90-minute small-group breakout-style workshop that asked participants to identify challenges to meeting and exceeding code and brainstorm how to resolve them, in small group breakouts moderated by seasoned professionals in the design community. The three small-group topics were: 1) commercial/historic buildings, 2) residential buildings, and 3) renewable energy, stretch codes, battery storage and electric vehicles. The results of the poster board session were accumulated and transcribed and then redistributed back to the group denoting barriers and proposed solutions for the respective topics.

Code Survey

Hawai‘i Energy worked with Blue Planet Foundation to survey the design and construction community about how much they know about the new energy conservation code, how they prefer to learn about the technical requirements, types of trainings they would like to attend, and barriers they encounter in meeting and exceeding code compliance. Recipients included builders, developers, architects, contractors (electrical, roofing, insulation, etc.), engineering and design firms, and some suppliers. Blue Planet mailed hardcopy postcards with a link to the survey to 422 recipients and emailed the survey to 366 recipients. To encourage participation, five persons who completed the survey online were selected at random to receive a small prize. About fifty professionals responded; approximately 35% were architects and 30% were contractors. As 80% of respondents expressed interest in attending in-person training workshops on the new code, Hawai‘i Energy will use the data in the survey to select relevant topics and delivery methods to ensure that free or low-cost training continues to be offered to both public sector and private sector professionals to prepare them to implement the code’s stricter provisions.

The codes survey was designed to solicit feedback on how Hawai‘i Energy can help support compliance and education around the new requirements.

Legislative Support

Hawai‘i Energy worked with Blue Planet Foundation (BPF) to hold 63 advocacy events for energy efficiency legislation and engagements supporting 2015 IECC adoption at the county level. These efforts took the form of media outreach, drafting testimony, meetings with senators and representatives, media interviews, press releases, etc.

Legislative Testimony and Bill Introduction

The Program supported numerous energy related bills in the 2018 state legislative session by submitting written testimony and attending hearings in person. Priority measures were mainly carried over from the previous year’s session and included State Appliance Efficiency Standards (HB556, SB1323), Solar Water Heater Variance Amendments (HB557, SB617) and Benchmarking for Commercial Buildings (HB1520). The major achievement of this legislative session was the successful adoption of HB556, introduced and championed by Hawai`i State Representative Nicole Lowen of District 6 (Kailua-Kona, Holulaloa, Kalaoa, Honokohau). The bill was finalized and signed into law after much collaborative effort between key entities, such as the Public Utilities Commission, the Department of Commerce and Consumer Affairs, Hawai‘i Energy and the State Energy Office. Blue Planet Foundation also played an important role helping bring these parties to arrive at compromise language while balancing concerns of each stakeholder.

Policy Information Briefings

In order to strategize and understand the political landscape, Blue Planet Foundation (under contract with Hawai‘i Energy) met with eleven Hawai‘i State Senators and Representatives to discuss clean energy and energy efficiency bills at the state legislature. In addition to those general meetings, Blue Planet Foundation held meetings with Senator Roz Baker, Representative Nicole Lowen, Senator Glenn Wakai and Governor David Ige specifically regarding appliance standards and bill amendments. In regards to City and County of Honolulu amendments to the state code, Blue Planet Foundation met with five city council members and Honolulu County Mayor Kirk Caldwell to discuss Bill 25 (city ordinance with amendments to Hawai‘i building energy code).

Media Outreach

As part of its work for Hawaiʻi Energy, BPF held editorial board meetings with major media outlets, such as the Honolulu Star-Advertiser, to engage in discussion around energy efficiency policies at the state legislature. The appliance standards saw an impressive amount of earned media throughout the legislative session, including nine articles in major media outlets, such as *Civil Beat* and the *Honolulu Star-Advertiser*.

Investigative Committee for Energy Efficiency Codes Coordination (EECC)

The Program led four State Building Code Council Energy Efficiency Code Coordination (EECC) committee meetings in which stakeholders and attendees from county and state government, nonprofits and the building industry discussed various topics related to code development and adoption. Throughout PY18, Maui and Kauaʻi counties adopted their own county-specific amendments while Oʻahu and Hawaiʻi Island continue to work on their own amendments as of this writing. Means of support for these counties were discussed, as well as some of the well-debated amendments, such as EV-ready infrastructure. Topics for future meetings will include new iterations of the code, ongoing training opportunities regarding the 2015 IECC, as well as the spring 2019 release of a white paper on the pathway to Net Zero in Hawaiʻi's residential sector, commissioned by Blue Planet Foundation for Hawaiʻi Energy and written by think tank and policy research nonprofit, the American Council for an Energy-Efficiency Economy (ACEEE). The investigative committee for EECC will continue to meet and engage with stakeholders to address concerns, share ideas on best practices and provide a vehicle to gather stakeholder input, and raise public awareness of key topics.

Clean Energy Collaboration

Hawaiian Electric Collaboration

Throughout Program Year 2018, Hawaiʻi Energy continued to build on the successful Collaboration Framework established 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. Notable accomplishments in PY18 included:

- An Integrated Demand Side Management (IDSM) pilot with Hawaiian Electric and Shifted Energy. Through these efforts, 20 grid interactive water heater (GIWH) devices were installed at Mānoa Gardens, a City and County of Honolulu-owned, low-income rental, elderly housing complex. The objective of this pilot was to determine the ability of an aggregated fleet of water heaters to serve as a dispatchable resource that accurately responds to utility signals, increasing flexibility in system operations and support stability and to help evaluate the feasibility and capability of GIWH devices to support grid service requirements. The 10-week test schedule included capacity-day-ahead scheduled load shifting, emergency demand response (DR), and fast frequency response events. Overall the tests were successful, with a few algorithm modifications identified to optimize responses. The installation process also identified a significant opportunity to increase energy literacy and identify energy efficiency opportunities. This collaboration effort will continue at scale in PY19.
- Participation in the Integrated Grid Planning (IGP) Stakeholder Council and multiple IGP working groups including distribution planning, grid services, forecasting assumptions, and procurement.

- Hawai‘i Energy reached hundreds of local families at HECO’s 15th 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 remains a standing contributor to HECO’s monthly *Smart Business Central* eNewsletter.
- Our updated smart thermostat rebate offering continued into PY18 with a total of 85 units incentivized in PY18. (See Smart Thermostats under the Residential Program – REEM section for further details.)
- Discussions continued regarding avoided cost treatment and system loss factor calculations 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 of significant importance and continuing dialogue among the parties will continue into future planning cycles.

Additionally, in PY18, 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:

- Coordinated customer engagement in the hotel, retail, and industrial sectors
- Small businesses saving energy across all three counties from referrals between Energy Advisors and HECO, HELCO and MECO CAMs
- Tag-team support for Honolulu hotels by assisting customers together at forum meetings and sharing contact information for the newest facility managers
- Collaborative participation in the Maui Facilities and Engineering Leadership Council

Ongoing Stakeholder Engagement

In PY18, Hawai‘i Energy hosted its second interactive stakeholder meeting to inform program planning efforts for the PY19-21 triennial period. Facilitated by Donna Ching of Pacific Center for Collaboration, attendees included representatives from a wide variety of fields, including government, public and private education, electric utility, hotels, business contractors and non-profits in efficiency, sustainability, and economic development. The interactive program was designed to elicit stakeholder feedback on Hawaii Energy’s next three-year program planning. The breakout sessions explored the Program’s main objectives and the impacts on the stakeholders, their organizations and their industry. Through these efforts, we were able to identify key areas for program evolution and elements that should be considered for the next 3-year program cycle. Three core areas emerged: Clean Energy Technologies, Accessibility & Affordability, and Market Transformation & Economic Development.

Electric Vehicle Charging Station (EVCS) Pilot Incentive Program

In PY18, Hawai'i Energy strategically aligned its energy efficiency measures with electrification of transportation (EoT) initiatives to help the state and counties achieve the combined goals of 100% clean energy, 100% carbon neutrality, and 100% clean transportation, all by 2045. The Program's first-ever Electric Vehicle Charging Station (EVCS) pilot rebate program was developed to:

1. increase adoption of electric vehicles and support grid stability through peak load shifting to daytime charging at the workplace (both high priority goals identified by the Hawaiian Electric Companies (HECO)), and
2. offset the purchase and installation costs of dual-port Level 2 EV charging stations at the workplace.

In the original program structure, HECO's EoT Department would identify and recruit workplaces to participate in the program; but the timing did not coincide for this Program Year and instead, the utility offered to assist with marketing and outreach efforts. Hawai'i Energy redesigned the program and secured co-funding from Ulupono Initiative, a local private impact-investing organization, who recommended adding multi-unit dwellings (MUDs) to the rebate eligibility and provided full funding for MUD rebates.

The rebate was set at $5,000 per station for new installations and $1,500 per station for retrofitting single-port to dual-port stations. Hawai'i Energy and Ulupono Initiative each funded 50% of each workplace rebate and Ulupono Initiative provided 100% of the funding for each MUD rebate. Hawai'i Energy administered the rebate through the Business program, launching it in January 2019 for both workplaces[7] and MUDs in Honolulu, Maui and Hawai'i counties. The offer was intended to close at the end of June 2019; however an extension was added through September 30, 2019 to allow customers more time to order equipment, obtain permits and complete installations. Charging stations were required to be actively-networked units that allow site hosts to maximize turnover and usage of the units, implement charging fees to help recover project costs, and provide usage data back to Hawai'i Energy to help inform future program design. The incentive was not intended for fleet or public charging, but rather for employee and/or tenant charging in order to encourage daytime charging and help shift energy usage away from evening peak usage periods.

Hawai'i Energy worked closely with Ulupono Initiative and HECO's EoT department to market this incentive to attract participation by potential rebate applicants, vendors and contractors in the EVCS sector through in-person engagement, as well as television, print and social media outlets. The Program created a new category of Clean Energy Allies (CEAs) for this EVCS incentive and saw a significant addition to the CEA program with 13 new EV installers, distributors, vendors and energy related contractors registering as trade allies. Hawai'i Energy staff also presented to numerous groups, including:

- HECO's key account managers
- Drive Electric Hawai'i and the Sustainable Transportation Coalition of Hawai'i (STCH)

[7] *Per the incentive eligibility parameters, workplaces were defined as office and multi-use commercial buildings, operating primarily between 7am-5pm; MUDs were defined as complexes with five or more housing units and a minimum of eight parking spots.*

- Attendees at an EVCS How-To panel session at Hawaiʻi Energy's annual Innovation Symposium
- EV contractors at a CEA Breakfast Meeting focused on the EVCS Pilot Incentive Program
- Building owners and managers at a commercial building management association annual membership meeting, condominium association board meetings, and a meeting with a property management company managing various commercial buildings statewide
- Industry events, such as a feature video shown at the annual Hawaiʻi Energy Conference on Maui, and a panel presentation at Renew Rebuild Hawaiʻi's Building Forum
- Booth presence at events, such as the Hawaiʻi Annual Auto Show and the Kapolei Sustainability & EV Fair

In PY18, Hawaiʻi Energy issued 15 rebates (6 first-time workplace installations, 1 workplace retrofitting, and 8 first-time MUD installations) for a total of $71,500 disbursed; there are currently an additional 6 rebates (4 first-time workplace installations and 2 first-time MUD installations) totaling $30,000 submitted during the extended pilot program period that are being processed at the time of this publication.

RAPID RESPONSE ENERGY PLAN

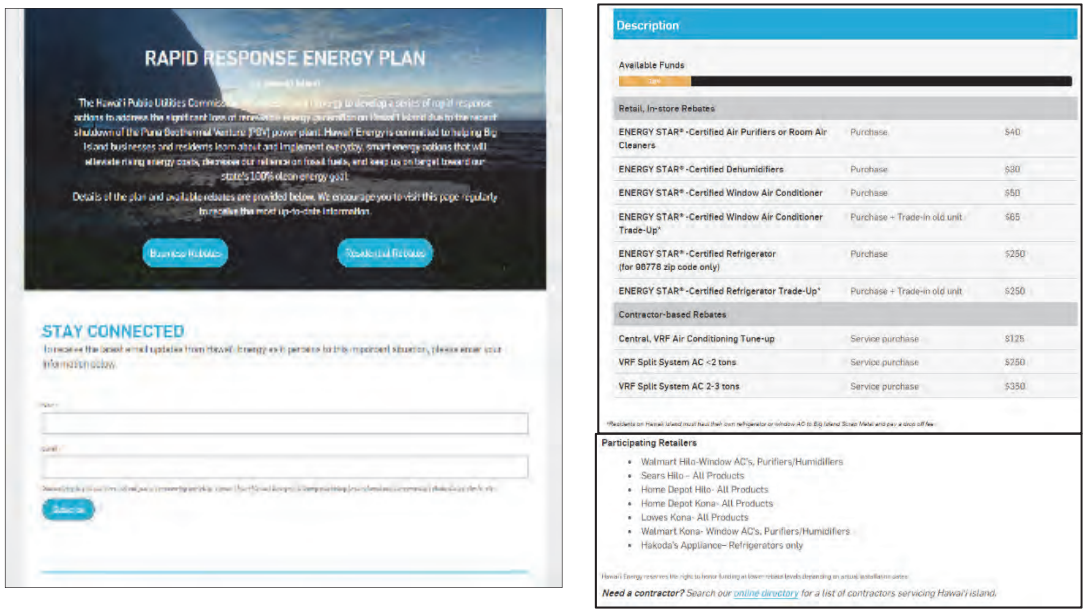
The 2018 eruption of Kīlauea Volcano on Hawai‘i Island led to the subsequent closure of the Puna Geothermal Venture (PGV) power plant, leading to a significant loss of renewable power generation. The PGV plant generated 38 MW firm or “baseload” power for the island of Hawai‘i, which provided about one-quarter of the island’s needs and represented more than half of all renewable energy generation on Hawai‘i island.

On June 15, 2018, the PUC announced that it had asked the Hawaiian Electric Companies and Hawai‘i Energy to “take immediate steps to respond to the economic, reliability, and renewable energy impacts created by the natural disaster.”[8] A news release issued by the PUC[9] stated that “At the request of Governor David Ige, the Hawai‘i Public Utilities Commission has met with the Hawaiian Electric Companies and Hawai‘i Energy to develop a series of rapid response actions to address the loss of renewable generation from the Puna Geothermal Venture (PGV) power plant due to the ongoing lava flow on Hawai‘i Island.”

Hawai‘i Energy responded by launching the Rapid Response Program on August 1, 2018. Through this effort, significantly elevated rebates were designated for specific equipment that were determined to have the greatest impact in reducing energy use for Hawai‘i island residents and businesses.

At launch, the effort included: a website resource page with rebate information, applications, and budget level trackers; publicity through the *Hawai‘i Tribune Herald*, KHON2 and *Hawai‘i News Now*; and key message points for communication with trade allies, customers and other key stakeholders. The Program also hosted public “talk story” sessions with contractors and retailers most affected by the increased demand for rebated products. More than 100 people opted in to receiving dedicated Rapid Response email announcements via the website, and additional Rapid Response messaging was distributed to our Clean Energy network through a monthly newsletter.

The overall stimulus included 3,311 total rebates versus 1,501 in PY17. This 121% increase was driven by serving significantly more hard-to-reach businesses and residents. See **Table 48** below for results by program. **Figure 11** illustrates the side-by-side comparison of rebates provided to residents and businesses of Hawai‘i county in PY17 versus PY18.



As part of Hawai‘i Energy’s quick response to the volcanic eruption on Hawai‘i Island, it was necessary to develop a landing page on the Program’s website to support the Business team and serve as a main resource for customers and contractors.

[8] *“New Plan Made To Address Energy Loss Due Shutdown of PGV Power Plant,” Hawai‘i News Now, August 13, 2018.* https://www.hawaiinewsnow.com/story/38438267/new-plan-to-address-energy-loss-due-shutdown-of-pgv-power-plant/

[9] *“PUC Initiates Response Plan to Address Shutdown of Puna Geothermal Power Plant on Hawai‘i Island”, June 2018.* https://puc.hawaii.gov/wp-content/uploads/2018/06/PUC-Initiates-PGV-Response-Plan-June-15-2018.pdf

Figure 11: Hawaii County Rebate Participation (PY17 vs. PY18)

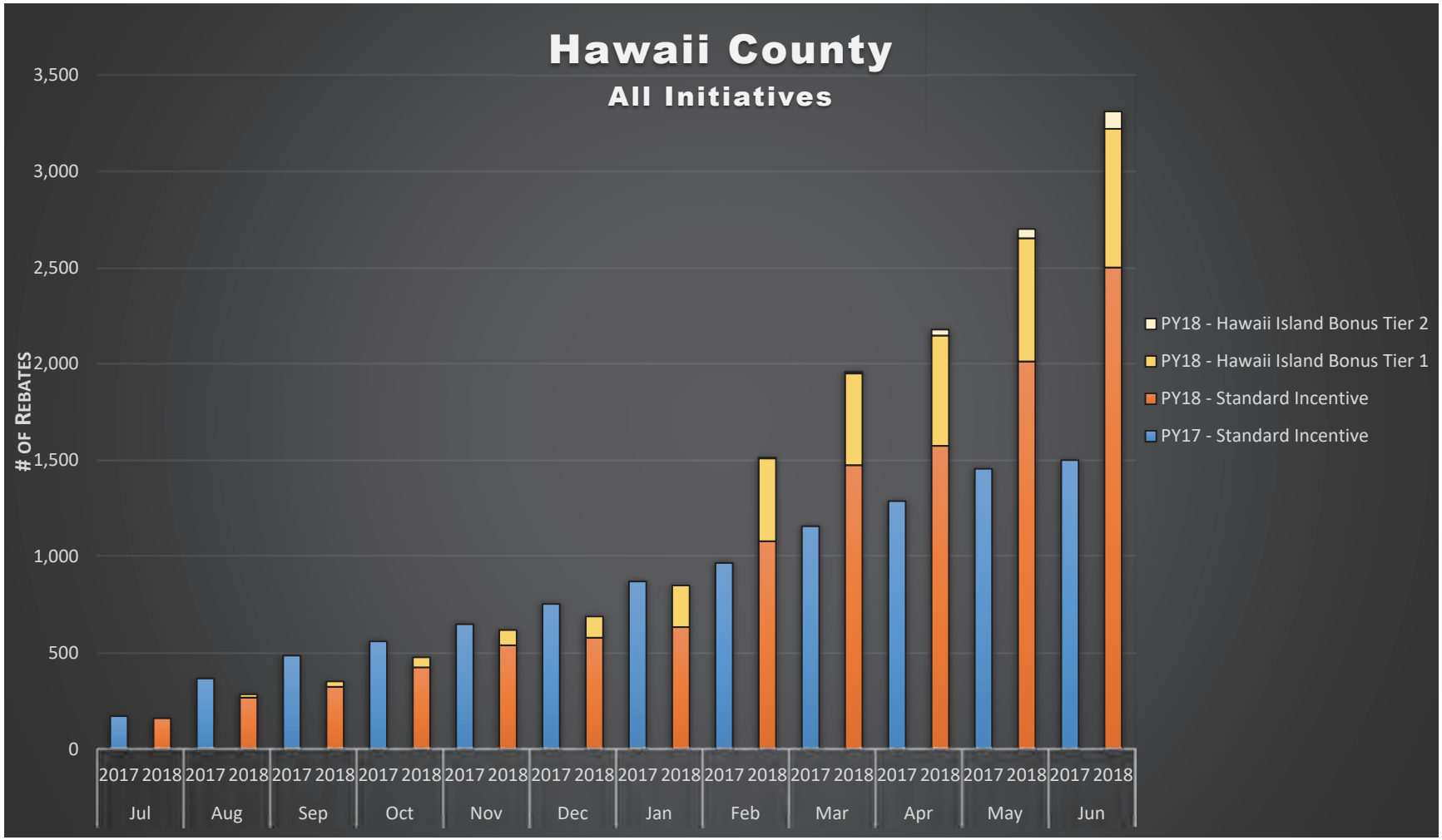


Table 48 **Number of Rebates by Program Initiatives**								
Program	**Rebates**	**Rebates % Difference**	**Program-level kW**	**kW % Difference**	**Program-level kWh**	**kWh % Difference**	**Program-level TRB**	**TRB % Difference**
PY18	**3,311**	**121%**	**2,864**	**-7%**	**17,228,489**	**3%**	**45,402,504**	**8%**
BEEM	118	-2%	721	22%	5,519,533	33%	17,470,157	38%
BESM	4	-	20	-	438,010	-	750,497	-
BHTR	301	149%	236	11%	2,005,834	38%	5,547,006	40%
CBEEM	29	0%	291	28%	1,795,165	25%	5,195,889	40%
REEM	1,587	68%	1,420	-26%	6,774,595	-26%	14,936,763	-28%
RESM	340	25%	16	80%	94,677	37%	64,893	2%
RHTR	932	7069%	160	47%	600,675	56%	1,437,299	58%
PY17	**1,501**	**-**	**3,078**	**-**	**16,671,117**	**-**	**42,071,687**	**-**
BEEM	121	-	593	-	4,147,897	-	12,627,173	-
BHTR	121	-	212	-	1,454,780	-	3,972,193	-
CBEEM	29	-	227	-	1,434,613	-	3,706,285	-
REEM	945	-	1,929	-	9,179,298	-	20,794,487	-
RESM	272	-	9	-	69,261	-	63,556	-
RHTR	13	-	109	-	385,267	-	907,993	-

Table 49 **Hawai‘i Island Incentives**		
Portfolio	**Rebates**	**Total Incentives ($)**
PY18	**3,311**	**$3,145,691**
Business	452	$1,865,897
Residential	2859	$1,279,794
PY17	**1,501**	**$2,426,672**
Business	271	$1,096,929
Residential	1230	$1,329,743

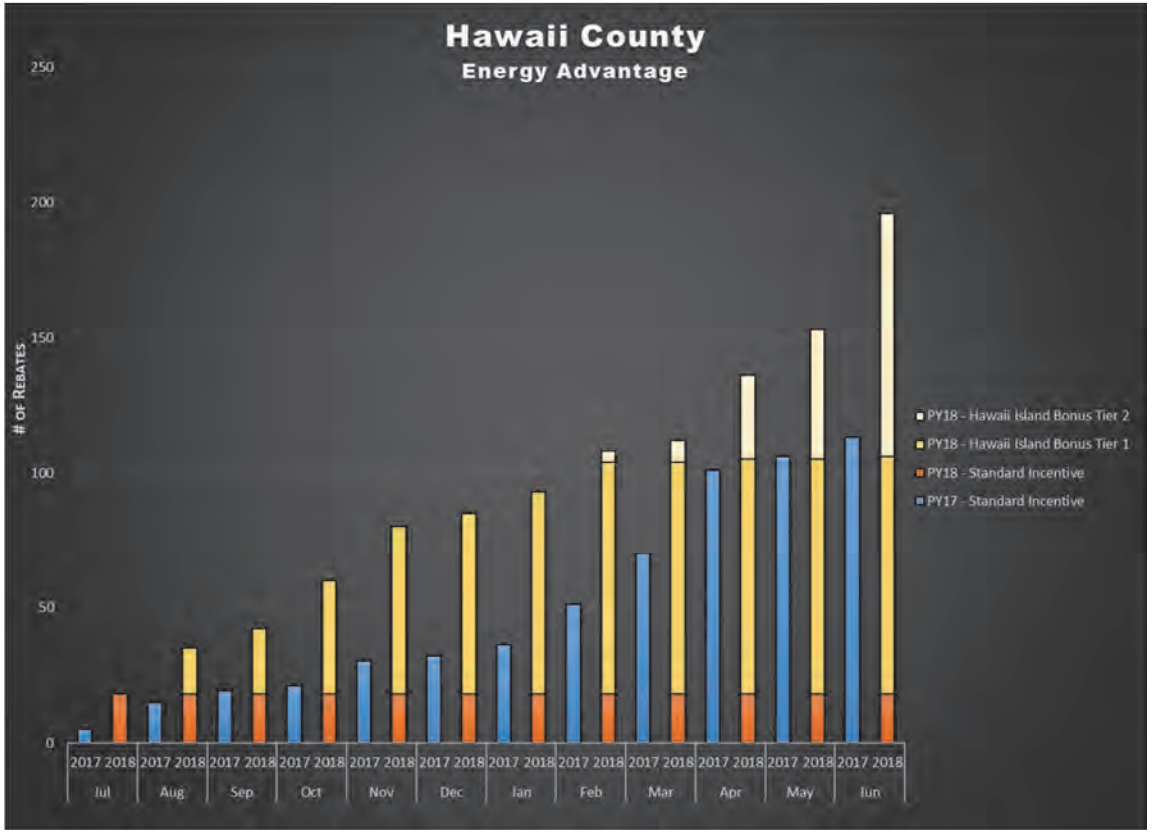
Rapid Response Highlights

The Business portfolio included enhanced rebates for lighting, HVAC, motors, re-/retro-commissioning, and customized projects. To remain cost-effective, the Program tracked spending at the higher incentive levels and implemented a second tier of lowered rebates for the Energy Advantage program after the initial budget was fully subscribed by February 2019. The rebate levels continued to be elevated above Oʻahu and Maui standard Energy Advantage rebates. As a result, Energy Advantage contractors across the state continued to deploy to Hawaiʻi Island to execute Rapid Response Plan projects. With elevated incentive levels, many Trade Allies were able to offer lighting retrofits at no cost and even complete projects for customers who had been unable or unwilling to participate in the past. The Rapid Response Plan for Energy Advantage achieved 196 projects and distributed over $663,000 dollars in PY18. This was a 73% increase in projects and 87% increase in incentive spend compared to PY17 metrics for Hawaiʻi Island. See **Figure 12** for a side-by-side comparison of PY17 vs. PY18 Hawaiʻi county Energy Advantage projects.

Overall, the Rapid Response plan resulted in an increase in PY18 Business program-level energy and demand savings of 39% and 23%, respectively, compared to the previous program year. In PY18, the Residential portfolio also more than doubled the number of rebates provided on Hawaiʻi island in PY17. **Table 49** shows the number and value of rebates provided for Hawaiʻi Island residents and businesses by Residential and Business portfolios in PY17 and PY18.

Due to poor air quality from the eruption, many residents decided to purchase air purifiers and air conditioners for their homes. Hawaiian Electric Light Company observed a noticeable increase in demand for electricity in the overnight hours due to residents running their A/C or air purifiers more frequently. Residential offerings were also added to the Hawaiʻi Energy added these measures specifically for the rapid response program given the uptick in purchasing and usage.

Figure 12: Hawaii County Energy Advantage Participation (PY17 vs. PY18)



CLEAN ENERGY ALLY PROGRAM

Introduction

The Clean Energy Ally (CEA) network acts as a force multiplier for Hawai'i Energy, supporting and leveraging architects, engineers, contractors, manufacturers, and distributors to increase program participation from commercial, residential and industrial customers. To date, there are over 450 participating companies in the CEA program. Besides helping customers implement efficiency projects and utilize Hawai'i Energy rebates and services, CEAs often facilitate a strong delivery market infrastructure that helps lower the cost of energy efficiency measures and, more importantly, serve as resources for customers who are actively in the buying process. In PY18, the 1,700+ custom and prescriptive projects performed by CEAs contributed 74 million kWh in savings, which is 80% of the portfolio goals.

In PY18, Hawaiʻi Energy focused on recruited Allies to align with the launch of new offerings (such as the EV charging station and commercial transformer incentives), deepening relationships and engagement with existing Allies through expanded and improved program offerings, and enhancing the value of CEA network membership. At the start of the year, the Program sought feedback from CEAs on several topics:

- New training and development opportunities
- CEA registration process and usability of the Clean Energy Ally website portal
- Clean Energy Ally membership benefits, including networking events, co-op advertising and the Energy Insider Rewards program
- Methods of communication on Program updates and other information

This feedback helped to shape networking events, streamlined application processes and website design and influenced the types of trainings offered, as outlined in the following sections.

Educational Workshops & Professional Training

The Program hosted several educational, technical and professional development trainings over the course of the year designed to help Allies gain a competitive edge in the industry. CEAs can stay abreast of market trends by obtaining knowledge, resources and credentials that enable them to deepen their service offerings and customer base. In PY18, the following trainings were offered:

- *Practical Energy Management for Buildings and Facilities* – a Practical Energy Management for Buildings and Facilities course was held in partnership with the University of Hawaiʻi (UH) Mānoa Outreach College. Building and facilities managers, consultants and energy industry staff learned how to create an energy plan and present it to management. Attendees also reviewed the fundamental building systems that can be retrofitted for greater efficiency and savings.
- *Solid-State Lighting Design and Lighting Controls Workshop (presented by Illuminating Engineering Society)* – this offering was tailored for Architects and Design Professionals. Attendees learned about the latest advances in LED lighting design strategies, color matrix, lighting calculation software and networked lighting controls. The workshop was taught by Steven Mesh, a lighting design expert and principal of Lighting Education + Design in San Francisco, California.

CEA Online Portal Revamp

Building off of last year's work to establish an online portal for CEAs, the Program continued to refine and enhance the portal to better service Allies' needs. The portal is a resource center for Allies to access Program applications, worksheets and marketing materials. Registering for the portal also allows Allies to be listed on Hawai'i Energy's online vendor directory – a customer-facing, searchable listing of all Allies. Customers who are looking for a contractor or vendor of energy efficiency products or services can find contact information and a hyperlink to Allies' websites.

PY18 Energy Insiders Rewards Members including representatives from Hawai'i Energy Systems, Energy Industries, Johnson Controls, EMCC, Pioneer Electric. (Not present: Hilo Air AC Refrigeration)

This year, the Program completed a revamp of the portal, featuring an easier-to-use interface, electronic onboarding process for new Allies, and upgraded search functions in the directory. Customers can now perform advanced and targeted searches for contractors who have reached program milestones for quantity and quality of projects, such as Energy Insider Rewards CEAs who have a "Golden Pluggy" status, a way of showcasing the CEAs that are most active and experienced in delivering our programs to customers. Ally feedback has been extremely positive, with many vendors reporting sales that originated from directory leads.

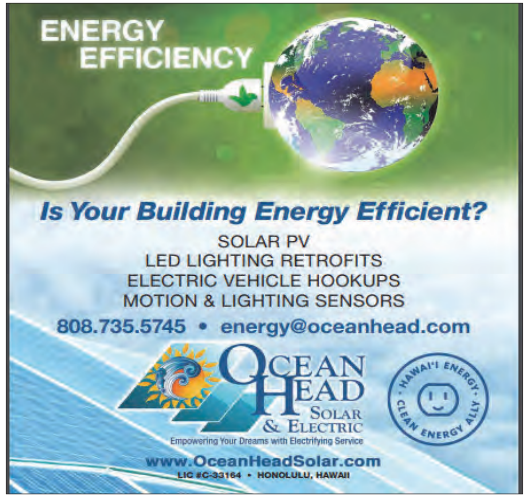
Program Benefits

Energy Insiders Rewards Program

Top-performing Allies were once again offered the chance to enroll in the *Energy Insiders Rewards* program for additional benefits. This program recognizes and rewards Allies who achieved a high volume of project completion (10 or above) within the program year. This year, six companies qualified as *Energy Insiders* members and received a Golden Pluggy status on the online vendor directory, a $1,000 bonus incentive coupon, a special feature spotlight in the CEA newsletter, recognition at the annual Clean Energy Ally Breakfast, and access to special networking events and promotional items from Hawai'i Energy.

Sales and Marketing Support via Co-op Advertising &Events

The Program also supports Allies' efforts to market Hawai'i Energy's offers by subsidizing their costs for advertising and outreach events. The co-op model continued to prove beneficial for all parties this year, with many Allies taking advantage of the $2,500 available to them to apply toward hosting a customer event or purchasing advertising space in exchange for co-branding those efforts with Hawai'i Energy.



Example of a CEA ad purchased through the co-op advertising offer with Building Management Hawai'i magazine (Trade Publishing).

<u>Co-Op Advertising</u>

In PY18, Hawai'i Energy worked with local magazine publisher, Trade Publishing, to apply the $2,500 co-op advertising credit to their sales portfolio. In this special offering, Trade Publishing sales reps leveraged the credit into customized ad packages (including one that offered three 1/3 page ads for "free") and managed the sales process, ad submission and reimbursement process for Allies. In previous years, the Program received feedback from some Allies that the co-op offer is attractive, but cumbersome for

them to participate in due to not having dedicated marketing or administrative staff to handle the reimbursement process. This partnership helped to eliminate some of those barriers for Allies, with the Trade Publishing staff taking on most of the legwork.

The response and interest was overwhelming, prompting Hawai‘i Energy to extend the offer until funds were exhausted for the year. Over 10 CEAs took advantage of this opportunity, and many more Allies have been put on a waiting list for this offer next year.

Co-Op Event Funding

Several Allies also took advantage of the $2,500 available to them to subsidize customer events. With co-op event funding, the Program’s stipulation is that the event must also include a short presentation by Hawai‘i Energy, which gives the Program the opportunity to share about our offerings as well as highlight our affiliation with that particular Ally. The Program has found that this is especially helpful for Allies who are new to Hawai‘i and seeking to build relationships with potential customers, or for Allies who are looking to expand or diversify their business. Below are descriptions of the events hosted this year:

Pictured above is Hoang Tran, Energy Advisor at Hawai‘i Energy, and Tim Van Horne from Powersmiths, presenting at a co-op event on transformers Below, the invitation for a different type of co-op event done in partnership with the local chapter of the U.S. Green Building Council at a newly-completed residential condominium in Honolulu.

- Illuminetex delivered a Lighting 101 Lunch & Learn co-op training event on Maui for new lighting distributors in the Midstream program. Training topics covered different light source technology, tips for identifying legacy lighting products to properly retrofit to new technology, basic lighting terms and measures, information needed to calculate energy savings of proposed retrofits, and the Hawai‘i Energy rebates that are available.
- The Program supported a co-op event with the U.S. Green Building Council (USGBC) to provide a green building tour of Anaha, a LEED Silver residential condominium in Kaka‘ako that is part of the Ward Village development. The event was supported by the Hawai`i Department of Business, Economic Development and Tourism (DBEDT) and attendees included Clean Energy Allies and Hawai‘i Energy customers. Participants had the opportunity to explore the common areas of the facility, a model unit, and hear about the energy efficiency systems.
- Powersmiths and Hawai`i Energy provided a co-op event on the benefits of ultra-low loss and high efficiency electrical power distribution transformers. Attendees learned about Hawai'i Energy’s new incentives for high-efficiency transformers and heard a presentation from Powersmiths on the paybacks and efficiency aspects of transformers in energy projects.

Gwen Yamamoto Lau, Executive Director of the Hawaii Green Infrastructure Authority speaking at Hawai‘i Energy’s Financing Energy Efficiency Lunch and Learn.

- Hawaiʻi Energy and USGBC again partnered to present a Co-Op funded sustainability-focused building tour of UH West Oahu's newest building, the Administration and Allied Health Facility. CEAs learned about the projects advanced energy efficiency lighting systems for the classrooms, as well as advanced irrigation systems for water efficiency. The facility demonstrates the University's environmental sustainability leadership and stewardship of the land
  for future development in West Oahu.

Networking Events

Based on the results of the survey at the beginning of the program year, CEAs indicated that they valued opportunities to connect and network to cross-promote energy efficiency products and services with other CEAs and to meet new potential customers in Hawaiʻi's business community. Based on the feedback, Hawaiʻi Energy offered multiple networking events throughout the Program year to help facilitate energy efficiency project implementation through interaction between CEAs and customers.

- Open House & Trade Show – Hawaiʻi Energy staff participated in two CEAs' open house and trade shows to promote Program incentive and rebates.
- Hawaiʻi Energy hosted a Lunch and Learn event for customers and CEAs in the hospitality industry and government sector. Six contractors representing lighting, lighting controls, HVAC and transformer technologies, as well as seven facility managers from hotels, state hospitals and Hawaiʻi Department of Transportation Roads & Highways Division, attended the event. The CEAs developed new contacts for energy efficiency projects, and the facility managers learned about new energy efficiency technologies and the Program incentives that are available for projects.
- The Program hosted a "Breakfast and Learn" event for CEAs as an informational networking event for CEAs and customers to learn about Hawai'i Energy's new Electric Vehicle Charging Station (EVCS) Pilot Incentive Program and to network with EV charging technology experts and peers in the industry. Over 30 CEAs and customers, including five EV charging station industry experts, attended the event.
- CEA Annual Information Meetings took place across the state with increased participation over the previous year. Discussions about removing the work order request requirement for both AC and Solar tune-ups, having ACH direct deposit for payments, registering for the Sense monitor program, and having the availability of fillable forms for rebate applications were positively received. Hawaiʻi Island attendees expressed concerns about water quality and the accelerated deterioration rate of the island's solar energy systems. As a result, Kona and Hilo representatives plan to re-evaluate the systems' lifespans and will possibly increase tune-up frequency.
- The Financing Energy Efficiency Lunch and Learn provided information on different types of financing options for energy efficiency projects. Local experts from the financial sector, energy services consulting, and the State of Hawaiʻi discussed different types of traditional and non-traditional financing options, including simple options like loans and leases to more specialized options, such as efficiency as a service and on-bill financing.

Innovation Symposium

The Symposium provides Allies with the opportunity to meet and network with potential and current customers, as well as receive technical training on the latest in energy efficiency. Only registered Clean Energy Allies are invited to exhibit as part of the Symposium's trade show, so not only does this annual event add value to the CEA membership, it provides a semi-exclusive venue for them to showcase their products to attendees. This year 24 Allies exhibited in the trade show and several others sponsored various elements of the conference in exchange for increased marketing exposure throughout the event. A long-time Ally, Hawai'i Energy Systems, was also recognized as the Clean Energy Ally of the year for their continued commitment to going above and beyond to service their customers.

Clean Energy Ally Refrigeration Systems exhibiting at the 2nd annual Innovation Symposium.

Annual CEA Kickoff Breakfast

The annual CEA Kickoff Breakfast, now in its fourth year, provides CEAs an opportunity to network with other contractors and learn about Hawai`i Energy's new offerings for the new program year. This year's event featured a keynote by Hawai'i State Representative Nicole Lowen, Chair of the House Committee on Energy and Environmental Protection, who has authored and passed several bills to support energy efficiency and clean energy transition in Hawai'i. Over 90 CEAs attended the breakfast and heard from Hawai'i Energy staff on new initiatives and incentives and updates and changes to the CEA program.

The CEA Kickoff Breakfast it the one event during the year that all of Hawai'i Energy's rebates and updates are presented to all Allies. The event also serves as a platform for the Program to thank Allies for their continued support.

CEA Monthly Newsletter

During PY18, Hawai'i Energy's Business Alliances Manager served as a primary point-of-contact to CEAs, providing them personalized attention and guidance on Program offerings. Personal phone calls with CEAs were common to discuss new technologies, keep a finger on the pulse of the market, and provide guidance and resources for new projects. This year, CEA feedback helped to shape events, streamlined application processes and influenced the types of trainings offered. CEAs also received a monthly newsletter, the "Clean Energy Ally Connection," to inform Allies on important Program developments, such as incentive changes, educational opportunities and networking events.

New Program Terms and Conditions and Code of Conduct

Since 2014, the CEA program has grown into a robust network of Clean Energy Allies. One of the goals in PY18 was to raise the bar on program qualifications and develop a deeper vetting process for CEAs participating in the program to enable exclusion of any bad market actors and unethical companies that are not properly certified to perform the appropriate work in Hawai'i. In PY18, new program terms and conditions and a new Code of Conduct were designed to implement screening criteria and increased program requirements to elevate the performance of participating CEAs. All new and existing CEAs in the program must meet these enhanced qualifications and adhere to the Code of Conduct to ensure a quality program that customers can rely on.

MARKETING & COMMUNICATIONS

In addition to direct marketing support for rebate and incentive programs, Hawai‘i Energy’s communications efforts for PY18 also included several key focus areas supporting overall brand awareness. These focus areas include initiatives to establish and maintain credibility as a community resource, increase brand name recall, and raise Hawai‘i Energy’s profile and the profiles of team members – work that makes indirect yet notable contributions to the Program’s ability to succeed and achieve overall energy reduction goals.

Advertising & Sponsorships

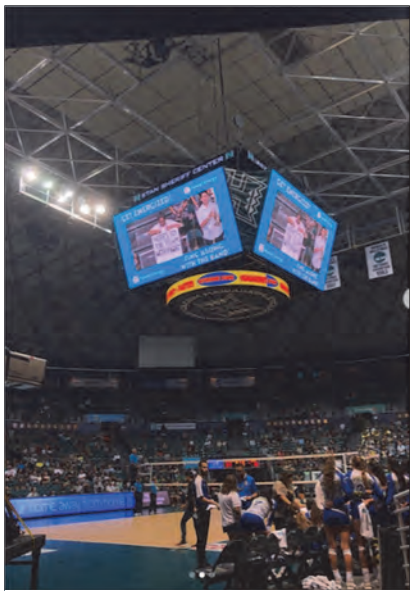
Without budget to produce a major mass media campaign this year, the Program looked to other smaller media buys and partnerships to continue building off the momentum generated by the 2017 campaign. The goal for PY18 was to stretch advertising dollars across platforms that would allow Hawai‘i Energy to strengthen relationships and use client benefits to boost other areas in addition to name recognition. The Program also focused on cost-effectiveness, opting for as much digital content as possible in order to repurpose content throughout the year.

University of Hawai‘i Athletics

As a result of a successful debut into sports events with the Diamond Head Classic and Hawai‘i Bowl, the Program expanded its sports marketing initiative with a partnership with University of Hawai‘i Athletics. Sponsoring UH Athletics puts the Hawai‘i Energy brand in front of a local audience, many of whom fit squarely within ideal demographics (e.g., home and business decision-makers)[10]. Furthermore, the Program is the only corporate partner representing the clean energy industry, which offers the ability to present efficiency content with limited conflicting or competing messaging.

This sponsorship included a mix of audience engagement activities, year-round signage in the Stan Sheriff Center and inclusion in pre- and in-game promotions for several of the University’s top-grossing sports, including men’s and women’s volleyball. The Program also utilized the sponsorship to engage with existing newsletter subscribers and outreach to event attendees and Clean Energy Allies by offering tickets to games as incentives for participating in Program activities, such as signing up for emails, engaging on social media and completing customer satisfaction surveys.

The Program focused its efforts on basketball and volleyball games this first year and, with average game attendance in the small thousands (including repeat attendees and season ticket holders), the Program enjoyed a high rate of exposure and brand recognition throughout the season. One example of this is the “Get Energized” segment occurring every game, where the pep band and cheerleaders lead the crowd in singing the University of Hawai‘i fight song and Hawai‘i Energy’s logo frames the videoboard, along with a corresponding announcement over the PA system.



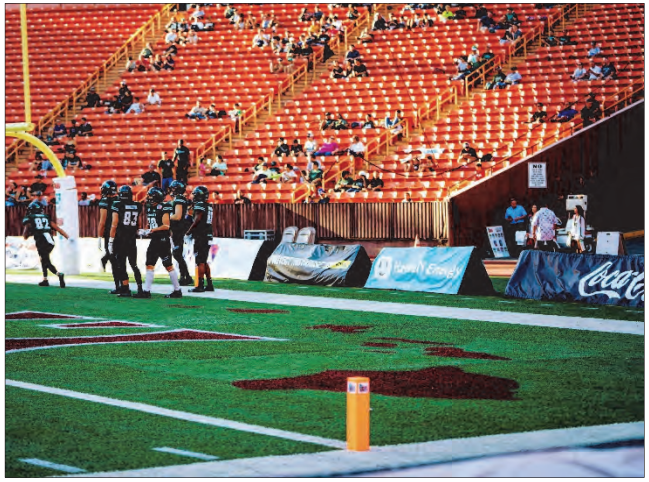
Jumbotron graphics and fan engagement activities like the popular “Get Energized!” fight song sing-along segment during all games in the Stan Sherriff Center were utilized to create a memorable experience for fans.

[10] *“77% of Hawai‘i fans are homeowners”, Scarborough Research, Honolulu, HI 2018 Release 2 (Aug. 2017 – Aug. 2018)*

Diamond Head Classic & Hawai‘i Bowl

PY18 marked the second year sponsoring the annual Hawai‘i Bowl and Diamond Head Classic tournament, both hosted by ESPN Events. With the University of Hawai‘i teams participating in both events this past December, the Program was again able to amplify branding efforts in front of a local audience with promotional giveaways, strategic logo placements, signage and appearances by Pluggy, the Program’s mascot. The Program also utilized its partnership to engage with fans on social media, cross-promoting the events and boosting engagement before and during the events.

ZAs with the UH Athletics sponsorship, this collaboration with ESPN also includes Hawai‘i Energy brand elements being featured on the live broadcasts of games. This year with the University of Hawai‘i playing in the Hawai‘i Bowl game, the Program received over $200,000 in combined media value from its signage placements during the television broadcasts over four days. The Program was also a featured sponsor of the Diamond Head Classic “Ball Kids” – in which youth participants assist with sweeping and wiping the court during the game – and Hawai‘i Energy’s logo was featured prominently on every child’s shirt throughout the tournament.



Hawai‘i: Energized! on Living808

The Program’s educational video series, *Hawai‘i: Energized!*, gained serious traction this year during a twelve-month partnership with local lifestyle show *Living808* on KHON2. The Program produced monthly 4-6 minute segments in line with its goal of explaining energy concepts and sharing efficiency benefits in a fun, lighthearted, easy-to-understand way. Popular topics included energy efficiency reviews of 2018’s hottest holiday tech gifts, a behind-the-scenes look at refrigerator recycling, and spotlighting commercial customers for their unique energy projects. The partnership also included 30-second commercial spots (allowing us to extend the life of the spots produced from last year) and additional promotion on *Living808*’s social media channels. On average, each *Living808* episode reaches 37,600 television viewers, and Hawai‘i Energy received several hundred additional views of its archived segments on the KHON2 website. In addition to the promotion provided by KHON2 on Facebook, the Program also pushed viewership of the segments through its own social media channels and emails, driving online video views even further.

Shifting from a quarterly to monthly series was no easy feat and required a significant increase in planning and production time. The Hawai‘i Energy team focused on maximizing the value of the segments by featuring key customers and Clean Energy Allies wherever possible. By doing so, the Program could strengthen relationships with these partners and open doors for future collaborations, while also driving participation in rebate programs. Some of the most memorable guest features were: Refrigerant Recycling, the Program’s contracted recycler for refrigerators, freezers and air conditioners (Feb. 2019); Hanalani Schools (Sep. 2018); and the Honolulu Board of Water Supply (May 2019) – all demonstrating different ways Hawai‘i Energy works with other organizations to better the community.

Hawaii: Energized! segments help to explain energy efficiency concepts using fun, humor, and relatable language, with the goal of making it easy for viewers to take energy-saving actions. Creative themes like the “Thumbs Up vs. Thumbs Down” for popular holiday gifts and a behind-the-scenes look at refrigerator recycling help shed an unexpected, but very educational light on energy topics and continues to be one of the strongest aspects of the show.

Market Research Study

As a follow-up to the PY17 ad campaign, the Program conducted a market research study in PY18 measuring the effectiveness of its branding and advertising efforts. As the Program and energy efficiency market evolve, the need to have solid data on which to base marketing and communications decisions becomes more and more important, especially as the Program seeks to drive deeper energy savings.

This particular study was designed to:

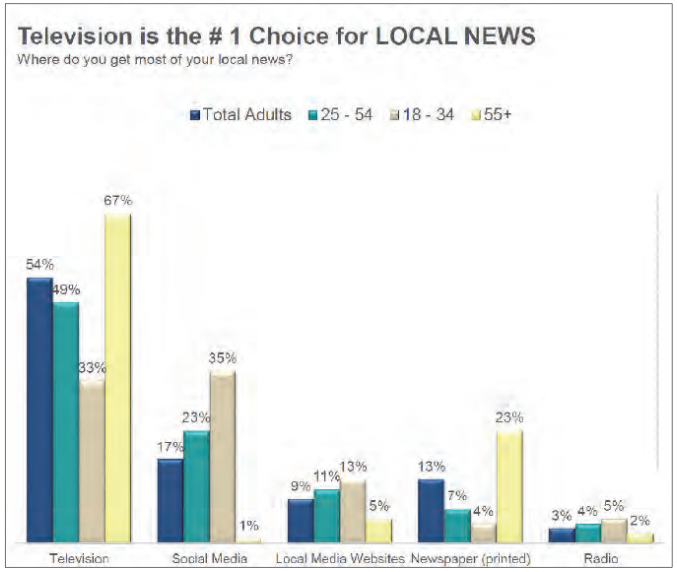
1. Capture feedback on and measure the effectiveness of the most recent ad campaign;
2. Measure the effectiveness of the Program's current communication channels; and
3. Gain a better understanding of how customers perceive the Program relative to the electric utility, in terms of trustworthiness, message effectiveness, and market confusion.

The Program worked with Market Trends Pacific, a local firm with over 25 years of experience polling Hawai'i residents. The study sample included participants from all three counties within Hawai'i Energy's service areas and included both homeowners and renters. Several notable takeaways from the study included:

1. **Television is Hawai'i Energy's customers' most prevalent and preferred source for energy information.**

   TV ranked the highest amongst both owners and renters for preferred source, general recall, and advertising recall*. Media market studies show that Hawai'i residents overwhelmingly prefer and watch TV for news/information compared to other mediums, which differs from most other areas of the country. Other sources like social media, direct mail, family and friends, and the electric utility also ranked within the top five choices for preferred sources, though the order was different for owners vs. renters.

   **Some questions measured participants' ability to recall specific advertisements, asking where they had seen a Hawai'i Energy ad. Other questions tested "general" recall, asking where a participant had seen or heard of Hawai'i Energy not specific to ads.*



Marshall Marketing, Hawai'i Market Report, May 2017

2. **The advertising campaign resonated positively, and our current mix of marketing channels and tactics are effective.**

   The PY17 campaign consisted of a mix of TV spots, 15-second social media video ads, and out-of-home placements. In addition, the Program's regular mix of marketing channels included in-store signage, print ads in magazines, sporting events, TV segments like *Hawai'i: Energized!*, and more. TV and social media were the most-mentioned channels for ad recall, but the Program was also pleased to learn that all of the top five most-mentioned channels were utilized within the last year.

Furthermore, when asked specifically about how ads made them feel, a large majority of participants said that Hawaiʻi Energy's ads caught their attention (80%), created a positive impression of the Program (82%), and influenced their energy efficiency behavior (66%). This means that ads and marketing pieces were effective where they were placed.

3. **Renters are a big opportunity for outreach/education, but messaging tactics must change.**

   47% of participants in the study identified themselves as renters and, in almost every response and category, their answers varied significantly compared to those of homeowners. Overall awareness of energy efficiency programs is lower in renters (39%) than in owners (64%), and there was an even larger disparity in participation in programs – 20% in renters and 49% in owners. A similar trend is prevalent when asked about awareness of Hawaiʻi Energy.

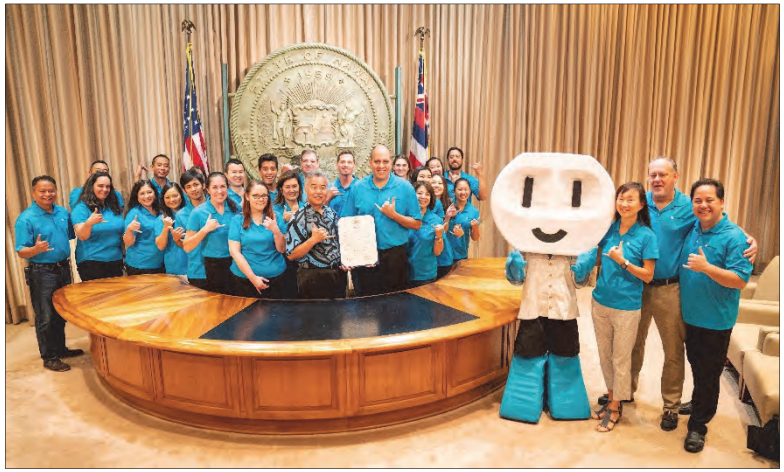
   In regards to preferred sources of information, renters rank social media and friends & family within their top three sources, whereas these choices did not even rank among the top five for owners. As Hawaiʻi Energy invests more into ensuring renters have access to energy efficiency measures and benefits, the data shows that the Program will need to adjust its communication tactics in order to be effective with this group.

4. **Word-of-mouth is powerful.**
   When asked the question, "In general, how much do you trust the following to be a source for accurate, reliable information about energy efficiency?," 32% of participants ranked "friends and family" as a source they trust completely. Hawaiʻi Energy received the second-highest "trust completely" ranking (19%) on the list that included the electric utility, contractors and government agencies.

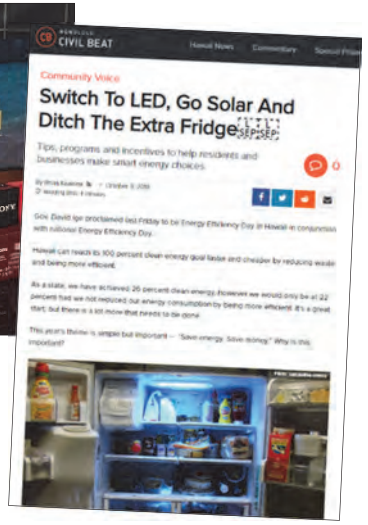
Periodic market research allows the Program to understand its customer base more intimately and strategize more effectively around audience, tactics and messaging. The Program will rely heavily on this data moving forward to make marketing decisions and prioritize tactics that may be underutilized. As the first study solely dedicated to gathering this type of data in the Program's history, Hawai`i Energy hopes it can serve as a benchmark and that regular investments into market research are justified.

National Energy Awareness Month

Celebrating Energy Awareness Month every October continues to be one of the Program's biggest opportunities to raise awareness of energy conservation across the state. Aligning with this national campaign, as well as with Energy Efficiency Day (Oct. 5) and ENERGY STAR® Day (Oct. 23), helps boost the Program's profile and establish it as a leading local resource for energy-saving tools and assistance. This year, with sustainability and climate change stories garnering frequent media attention, the Program leveraged its offerings and connections, targeting prominent media outlets and partners to help bring energy conservation to the forefront, all while infusing Hawaiʻi Energy's signature fun elements. Campaign elements included:



- A gubernatorial proclamation & ceremony for Energy Efficiency Day (Oct. 5)
- Media outreach, resulting in the following coverage:
    - TV morning show appearances promoting national ENERGY STAR® Day on local news stations KITV4, Hawaiʻi News Now and KHON2
    - A Community Voice article in *Civil Beat*[11] by Executive Director Brian Kealoha
    - A feature in the "5 Reasons to Be Optimistic about Hawaiʻi's Clean Energy Future" article in *Hawaiʻi Business* magazine's October issue



- Sponsoring music video production for "Energy Star," a song from the musical *SHOCKA: The Story of Energy In Hawaiʻi* by the Honolulu Theatre for Youth. The video debuted online on Oct. 1 and was distributed to hundreds of teachers statewide as promotional material for the show's upcoming tour.
- Various email blasts and newsletters targeted toward residential customers, business customers and CEAs
- Frequent social media posts and shared content
- Numerous community outreach events, including the Hawaiian Electric Company's annual Clean Energy Fair and a presentation at Honowai Elementary School's Green Ribbon Award ceremony, which recognized the school for its efforts to prioritize sustainability, including integrating a number of efficiency efforts.

The campaign received more than 160,000 impressions across online and print platforms in addition to TV viewership, making it cumulatively one of the widest-reaching Energy Awareness Month campaigns in the history of the Program.

[11] "*Switch to LEDs, Go Solar, and Ditch the Extra Fridge," Civil Beat – Community Voice, October 9, 2018,* https://www.civilbeat.org/2018/10/switch-to-led-go-solar-and-ditch-the-extra-fridge%e2%80%a8%e2%80%a8/

Team Awards & Recognitions

The Program received several recognitions in PY18 that helped to raise brand awareness and elevate Hawai‘i Energy’s profile within the business community.

- **ENERGY STAR® Award for Excellence in Promotion**

  The Energy Awareness Month campaign earned the Program national recognition from the U.S. Environmental Protection Agency at the 2019 ENERGY STAR® Awards held in Washington, D.C. This was the first time Hawai‘i Energy has received one of these awards, and the organizers enjoyed the “Energy Star” music video so much they played it during the awards ceremony.

- **Best Places to Work** – *2nd place Small Company, 3rd place Most Family-Friendly Small Company*

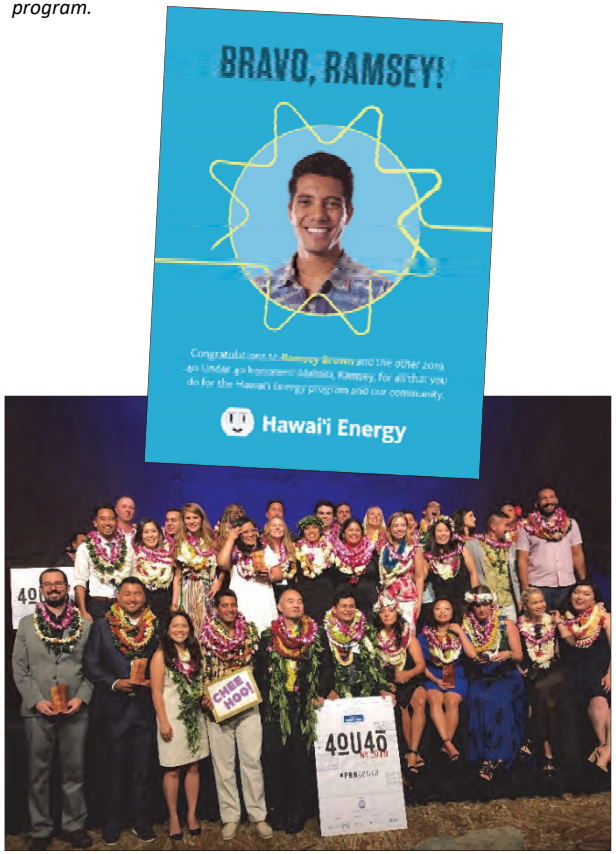
  As part of parent company Leidos, Inc., the Program made *Hawai‘i Business* magazine’s annual list of Best Places to Work® (published in April 2019) for the second year in a row. The annual competition evaluates company benefits, culture, working conditions and overall employee satisfaction, among other criteria, through an anonymous employee survey and recognizes the 70 best companies out of hundreds of applicants. This year, Hawai‘i Energy also earned spots as the second-best Small Company and third-best Most Family-Friendly Small Company, further highlighting the importance and uniqueness of this team’s healthy organizational culture, as well as demonstrating that Hawai‘i Energy truly embodies being a fresh, fun and happy brand.

- ***Pacific Business News’* 40 Under 40**

  Resource Acquisition Manager Ramsey Brown helped bring Hawai‘i Energy’s work into the spotlight as he was selected for *Pacific Business News’* 2019 class of “40 Under 40” award recipients (published in April 2019). This distinction is given annually to 40 emerging young business leaders who are making a difference, and members are nominated by others in the community. Having a team leader earn this distinction is valuable for the Program as it showcases Hawai‘i Energy as a key community contributor and allows others to learn more about our work.

These awards prove that Hawai‘i Energy’s brand awareness has as much to do with investing in people and the operational teams as it does with investing in content and advertising. The Program will continue finding ways to elevate team members and the organization and invest in culture-building as a critical part of its marketing & communications strategy.

Accepting the ENERGY STAR® Excellence in Promotion award at the ceremony in Washington, D.C (top). Below, Ramsey at the 2019 40 Under 40 recognition ceremony and the ad that ran in the event program.



APPENDIX

APPENDIX A – PORTFOLIO IMPACTS

Introduction

The PY2018 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	879	277,195	$3,815,295	7,428	52,353,065	829,344,884
CBEEM	304	351	$4,631,695	5,456	38,887,755	578,907,592
BESM	271	271	$213,436	51	670,821	6,100,634
BHTR	1174	52980	$2,632,266	1247.028107	9957188.182	138752078.3
Commercial Total	**2,628**	**330,797**	**$11,292,693**	**14,181**	**101,868,829**	**1,553,105,189**
REEM	11,648	3,688,731	$5,783,009	10,819	56,019,197	661,067,542
CREEM	21	21	$85,550	34.772419	250,580	1,187,415
RESM	6,890	6,890	$672,650	458.034863	2,304,039	4,573,347
RHTR	2848	40389	$834,017	519.416796	1830002.703	17876129.65
Residential Total	**21,407**	**3,736,031**	**$7,375,226**	**11,831**	**60,403,819**	**684,704,434**
Total	**24,035**	**4,066,828**	**$18,667,919**	**26,012**	**162,272,648**	**2,237,809,622**

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	$0.07	$0.00	$168,558,609	$27,920,124	44.2	7.3	6.0
CBEEM	$0.12	$0.01	$107,421,415	$19,446,984	23.2	4.2	5.5
BHTR	$0.32	$0.03	$1,111,672	$31,216,611	5.2	146.3	0.0
BESM	$0	$0	$28,015,636	$2,936,422	10.6	1.1	9.5
Business Totals	**$0.11**	**$0.01**	**$305,107,333**	**$81,520,141**	**27.0**	**7.2**	**3.7**
REEM	$0.10	$0.01	$140,297,204	$51,560,286	24.3	8.9	2.7
RHTR	$0.34	$0.07	$278,179	$85,550	3.3	1.0	3.3
RESM	$0.29	$0.15	$929,831	$2,067,150	1.4	3.1	0.4
CESH	$0	$0	$4,418,720	$834,017	5.3	1.0	5.3
Residential Totals	**$0.12**	**$0.01**	**$145,923,934**	**$54,547,003**	**19.8**	**7.4**	**2.7**
Total	**$0.12**	**$0.01**	**$451,031,267**	**$136,067,145**	**24.2**	**7.3**	**3.3**

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

Table A2 Cumulative Annual Electric Savings (Customer Level) by Budget Category						
Program	**Apps Processed**	**Quantity of Energy Efficient Equipment (Units)**	**Incentives ($)**	**Demand Impact (kW)**	**First Year Energy Impact (kWh 1st Year)**	**Lifetime Energy Impact (kWh - Life)**
BEEM	879	277,195	$3,815,295	6,708	47,307,104	749,372,749
CBEEM	304	351	$4,631,695	4,917	35,037,387	521,583,937
BESM	271	271	$213,436	46.015	611,675	5,564,277
BHTR	1174	52980	$2,632,266	1128.2099	9008797.221	125534634.9
Commercial Total	**2,628**	**330,797**	**$11,292,693**	**12,799**	**91,964,964**	**1,402,055,597**
REEM	11,648	3,688,731	$5,783,009	9,778	50,638,820	597,585,515
CREEM	21	21	$85,550	31.2786	225,402	1,068,107
RESM	6,890	6,890	$672,650	412.433	2,075,178	4,122,954
RHTR	2848	40389	$834,017	472.09	1664232.08	16263420.4
Residential Total	**21,407**	**3,736,031**	**$7,375,226**	**10,694**	**54,603,632**	**619,039,997**
Total	**24,035**	**4,066,828**	**$18,667,919**	**23,493**	**146,568,596**	**2,021,095,594**

Program	**First Year Impact Cost ($/kWh)**	**Lifetime Impact Cost ($/kWh)**	**Total Resource Benefit (TRB)**	**Total Resource Cost (TRC)**	**Driven Benefit Ratio (TRB / Incentive $)**	**Driven Investment Ratio (TRC / Incentive $)**	**Benefit Test (TRB/TRC)**
BEEM	$0.08	$0.01	$152,284,066	$27,920,124	39.9	7.3	5.5
CBEEM	$0.13	$0.01	$96,799,123	$19,446,984	20.9	4.2	5.0
BESM	$0.35	$0.04	$1,014,122	$31,216,611	4.8	146.3	0.0
BHTR	$0	$0	$25,346,736	$2,936,422	9.6	1.1	8.6
Commercial Total	**$0.12**	**$0.01**	**$275,444,047**	**$81,520,141**	**24.4**	**7.2**	**3.4**
REEM	$0.11	$0.01	$126,814,706	$51,560,286	21.9	8.9	2.5
CREEM	$0.38	$0.08	$250,228	$85,550	2.9	1.0	2.9
RESM	$0.32	$0.16	$838,363	$2,067,150	1.2	3.1	0.4
RHTR	$1	$0	$4,019,135	$834,017	4.8	1.0	4.8
Residential Total	**$0.14**	**$0.01**	**$131,922,432**	**$54,547,003**	**17.9**	**7.4**	**2.4**
Total	**$0.13**	**$0.01**	**$407,366,480**	**$136,067,145**	**21.8**	**7.3**	**3.0**

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	107,718,394	11.17%	119,750,539	76.01%	91,027,740
Hawaiʻi Island	20,580,498	9.00%	22,432,743	76.80%	17,228,489
Maui	17,603,222	9.96%	19,356,503	75.64%	14,640,602
Lānaʻi	349,232	9.96%	384,015	97.21%	373,284
Molokaʻi	317,249	9.96%	348,848	89.80%	313,255
Total	**146,568,596**	**10.71%**	**162,272,648**	**76.16%**	**123,583,370**
Percent of Customer Level Savings			**111%**		**84%**

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	17,386	11.17%	19,328	78.33%	15,139
Hawaiʻi Island	3,293	9.00%	3,589	79.78%	2863.511415
Maui	2,649	9.96%	2,913	78.84%	2,296
Lānaʻi	101	9.96%	111	98.52%	109.816007
Molokaʻi	64	9.96%	70	91.71%	65
Total	**23,493**	**10.72%**	**26,012**	**78.71%**	**20,473**
Percent of Customer Level Savings			**111%**		**87%**

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	47,307,104	10.67%	52,353,065	75.00%	39,264,799
CBEEM	35,037,387	10.99%	38,887,755	75.00%	29,165,816
BESM	611675.43	10%	670820.6188	95%	637279.5879
BHTR	9,008,797	10.53%	9,957,188	99.02%	9,859,204
Commercial Total	**91,964,964**	**10.77%**	**101,868,829**	**77.48%**	**78,927,099**
REEM	50,638,820	10.63%	56,019,197	72.37%	40,543,675
CREEM	225402.22	11%	250579.648	65%	162876.7712
RESM	2,075,178	11.03%	2,304,039	92.00%	2,119,716
RHTR	1,664,232	9.96%	1,830,003	100.00%	1,830,003
Residential Total	**54,603,632**	**10.62%**	**60,403,819**	**73.93%**	**44,656,271**
Total	**146,568,596**	**10.71%**	**162,272,648**	**76.16%**	**123,583,370**
Percent of Customer Level Savings			**111%**		**84%**

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	6,708	10.73%	7,428	75.00%	5,571
CBEEM	4,917	10.96%	5,456	75.00%	4,092
BESM	46.015	10%	50.731352	95%	48.194707
BHTR	1,128	10.53%	1,247	99.05%	1,235
Commercial Total	**12,799**	**10.80%**	**14,181**	**77.19%**	**10,946**
REEM	9,778	10.64%	10,819	79.16%	8,564
CREEM	31.2786	11%	34.772419	65%	22.602072
RESM	412.433	11.06%	458.034863	92.00%	421.393653
RHTR	472.09	10.02%	519.416796	100.00%	519.416796
Residential Total	**10,694**	**10.63%**	**11,831**	**80.53%**	**9,527**
Total	**23,493**	**10.72%**	**26,012**	**78.71%**	**20,473**
Percent of Customer Level Savings			**111%**		**87%**

Measure Contribution toward Savings Impacts

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

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

Table A7
Program Energy Impact by Rate Schedule

Island	R	G	J	P	DS	F	Other*	Total	Pct
O‘ahu	30,720,763	2,957,235	22,128,397	20,171,757	8,848,810	6,200,779	-	91,027,740	73.66%
Hawai‘i Island	7,466,284	1,696,945	5,465,046	2,600,214	0	-	0	17,228,489	13.94%
Maui	5,784,854	893,492	4,623,811	3,338,445	0	0	0	14,640,602	11.85%
Lāna‘i	365,708	2094.672	5,482	0	0	0	0	373,284	0.30%
Moloka‘i	273,235	16,144	23,875	0	0	0	0	313,255	0.25%
Total	**44,610,844**	**5,565,911**	**32,246,610**	**26,110,415**	**8,848,810**	**6,200,779**	**0**	**123,583,370**	**100.00%**
Percent	**36.10%**	**4.50%**	**26.09%**	**21.13%**	**7.16%**	**5.02%**	**0.00%**	**100.00%**	

*Other combines the less frequently assigned rate codes for PY18

Table A8
Portfolio Demand (kW) Program Level Impacts by Island and Rate Schedule

Island	R	G	J	P	DS	F	Other*	Total	%
O‘ahu	6,568	324	2,873	3,032	1,397	945	-	15,139	73.95%
Hawai‘i Island	1,595	191	614	463	0	-	0	2,864	13.99%
Maui	1,188	108	486	513	0	0	0	2,296	11.22%
Lāna‘i	109	0.633371	0	0	0	0	0	110	0.54%
Moloka‘i	58	3	4	0	0	0	0	65	0.32%
Total	**9,517**	**627**	**3,979**	**4,008**	**1,397**	**945**	**-**	**20,473**	**100.00%**
Percent	**46.49%**	**3.06%**	**19.43%**	**19.58%**	**6.82%**	**4.62%**	**0.00%**	**100.00%**	

*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	14,517	477,037	20,413,444	13,167,868	5,191,932	0	0	39,264,799	31.8%
CBEEM	208	488,073	7,102,113	11,718,519	3,656,124	6,200,779	0	29,165,816	23.6%
BESM	2,726	12,974	406,556	215,024	0	0	0	637,280	0.5%
BHTR	1,548	4,549,821	4,310,473	997,363	0	0	0	9,859,204	8.0%
Commercial Total	**18,999**	**5,527,906**	**32,232,585**	**26,098,774**	**8,848,056**	**6,200,779**	**0**	**78,927,099**	**63.9%**
REEM	40,497,465	24,091	11,709	9,656	754	0	0	40,543,675	32.8%
CREEM	162,877	0	0	0	0	0	0	162,877	0.1%
RESM	2,105,880	9,536	2,316	1,985	0	0	0	2,119,716	1.7%
RHTR	1,825,624	4,378	0	0	0	0	0	1,830,003	1.5%
Residential Total	**44,591,845**	**38,005**	**14,025**	**11,641**	**754**	**0**	**0**	**44,656,271**	**36.1%**
Total	**44,610,844**	**5,565,911**	**32,246,610**	**26,110,415**	**8,848,810**	**6,200,779**	**0**	**123,583,370**	**100.0%**
Percent	**36.1%**	**4.5%**	**26.1%**	**21.1%**	**7.2%**	**5.0%**	**0.0%**	**100.0%**	

*Other combines the less frequently assigned rate codes for PY18

Table A10 Program Demand Impact by Rate Class									
Program	**R**	**G**	**J**	**P**	**DS**	**F**	**Other***	**Total**	**%**
BEEM	3	71	2,334	2,202	961	0	0	5,571	27.2%
CBEEM	0	72	1,005	1,634	436	945	0	4,092	20.0%
BESM	1	3	18	26	0	0	0	48	0.2%
BHTR	1	472	618	144	0	0	0	1,235	6.0%
Commercial Total	**4**	**618**	**3,976**	**4,006**	**1,397**	**945**	**0**	**10,946**	**53.5%**
REEM	8,555	5	2	2	0	0	0	8,564	41.8%
CREEM	23	0	0	0	0	0	0	23	0.1%
RESM	418	2	1	0	0	0	0	421	2.1%
RHTR	518	2	0	0	0	0	0	519	2.5%
Residential Total	**9,513**	**9**	**2**	**2**	**0**	**0**	**0**	**9,527**	**46.5%**
Total	**9,517**	**627**	**3,979**	**4,008**	**1,397**	**945**	**0**	**20,473**	**100.0%**
Percent	**46.5%**	**3.1%**	**19.4%**	**19.6%**	**6.8%**	**4.6%**	**0.0%**	**100.0%**	

*Other combines the less frequently assigned rate codes for PY17

Table A11 Customer Energy Impact by Rate Class									
Program	**R**	**G**	**J**	**P**	**DS**	**F**	**Other***	**Total**	**%**
BEEM	17,531	574,488	24,626,979	15,861,087	6,227,018	0	0	47,307,104	32.3%
CBEEM	249	588,946	8,542,621	14,083,554	4,385,025	7,436,993	0	35,037,387	23.9%
BESM	2,588	12,291	389,660	207,137	0	0	0	611,675	0.4%
BHTR	1,397	4,168,690	3,928,849	909,862	0	0	0	9,008,797	6.1%
Commercial Total	**21,765**	**5,344,415**	**37,488,109**	**31,061,640**	**10,612,043**	**7,436,993**	**0**	**91,964,964**	**62.7%**
REEM	50,585,986	27,556	13,373	11,045	859	0	0	50,638,820	34.5%
CREEM	225,402	0	0	0	0	0	0	225,402	0.2%
RESM	2,061,642	9,331	2,264	1,941	0	0	0	2,075,178	1.4%
RHTR	1,660,269	3,963	0	0	0	0	0	1,664,232	1.1%
Residential Total	**54,533,299**	**40,851**	**15,637**	**12,986**	**859**	**0**	**0**	**54,603,632**	**37.3%**
Total	**54,555,063**	**5,385,266**	**37,503,746**	**31,074,626**	**10,612,902**	**7,436,993**	**0**	**146,568,596**	**100.0%**
Percent	**37.2%**	**3.7%**	**25.6%**	**21.2%**	**7.2%**	**5.1%**	**0.0%**	**100.0%**	

*Other combines the less frequently assigned rate codes for PY18

Table A12 Customer Demand Impact by Rate Class									
Program	**R**	**G**	**J**	**P**	**DS**	**F**	**Other***	**Total**	**%**
BEEM	3	85	2,814	2,653	1,152	0	0	6,708	28.6%
CBEEM	0	87	1,210	1,964	523	1,133	0	4,917	20.9%
BESM	1	3	17	25	0	0	0	46	0.2%
BHTR	1	433	563	132	0	0	0	1,128	4.8%
Commercial Total	**4**	**608**	**4,605**	**4,774**	**1,675**	**1,133**	**0**	**12,799**	**54.5%**
REEM	9,768	6	2	2	0	0	0	9,778	41.6%
CREEM	31	0	0	0	0	0	0	31	0.1%
RESM	410	2	1	0	0	0	0	412	1.8%
RHTR	471	1	0	0	0	0	0	472	2.0%
Residential Total	**10,680**	**9**	**3**	**2**	**0**	**0**	**0**	**10,694**	**45.5%**
Total	**10,684**	**617**	**4,607**	**4,776**	**1,675**	**1,133**	**0**	**23,493**	**100.0%**
Percent	**45.5%**	**2.6%**	**19.6%**	**20.3%**	**7.1%**	**4.8%**	**0.0%**	**100.0%**	

*Other combines the less frequently assigned rate codes for PY18

Portfolio Total Resource Benefit and Total Resource Cost

TRC Test

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

Table A13 TRC Measure Values														
Measure	Program Demand (kW)	%	Program Energy (kWh 1st Yr)	%	Program Energy (kWh - Life)	%	Average Measure Life (Yrs)	TRB/TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
LED Lighting	2,797	13.7%	22,313,253	18.1%	334,064,690	20.2%	15.0	5.1	$67,197,862	20.2%	$13,206,277	9.7%	$2,487,267	13.3%
Custom Lighting	3,083	15.1%	21,022,655	17.0%	295,338,341	17.9%	14.0	3.9	$56,286,390	16.9%	$14,408,554	10.6%	$3,481,030	18.6%
LED Linear	2,021	9.9%	18,753,967	15.2%	276,646,386	16.7%	14.8	4.5	$53,617,565	16.1%	$11,846,950	8.7%	$2,335,009	12.5%
Chillers	1,903	9.3%	7,910,258	6.4%	157,266,688	9.5%	19.9	3.3	$34,723,638	10.4%	$10,645,091	7.8%	$458,374	2.5%
Custom	483	2.4%	4,842,079	3.9%	86,643,661	5.2%	17.9	6.1	$13,957,110	4.2%	$2,269,529	1.7%	$856,739	4.6%
LED Specialty	489	2.4%	5,009,427	4.1%	74,374,952	4.5%	14.8	13.1	$14,048,655	4.2%	$1,076,376	0.8%	$909,639	4.9%
Custom HVAC	538	2.6%	3,671,216	3.0%	55,260,211	3.3%	15.1	3.9	$10,828,336	3.2%	$2,777,008	2.0%	$443,838	2.4%
Solar Water Heating	577	2.8%	2,689,324	2.2%	53,786,471	3.3%	20.0	1.2	$11,351,813	3.4%	$9,507,000	7.0%	$1,051,881	5.6%
Refrigerator w/ Trade In	554	2.7%	3,401,333	2.8%	47,618,658	2.9%	14.0	1.9	$10,524,670	3.2%	$5,683,200	4.2%	$756,900	4.1%
LED Omni Directional	298	1.5%	2,993,960	2.4%	44,005,830	2.7%	14.7	6.4	$8,357,603	2.5%	$1,304,590	1.0%	$290,018	1.6%
Split Systems: 15% Better Than Code	563	2.8%	2,518,373	2.0%	37,775,600	2.3%	15.0	29.2	$9,258,231	2.8%	$316,624	0.2%	$450,884	2.4%
Variable Refrigerant Flow Air Conditioners	589	2.9%	2,148,459	1.7%	32,226,886	1.9%	15.0	0.5	$8,626,130	2.6%	$19,117,042	14.0%	$358,650	1.9%
Custom - High Efficiency Lighting	236	1.2%	2,017,259	1.6%	28,241,630	1.7%	14.0	10.6	$5,636,063	1.7%	$532,223	0.4%	$532,223	2.9%
Custom - EMS TBD	124	0.6%	931,623	0.8%	13,974,350	0.8%	15.0	6.4	$2,860,394	0.9%	$448,500	0.3%	$112,125	0.6%
Peer Group Comparison	4,050	19.8%	12,149,837	9.8%	12,149,837	0.7%	1.0	0.0	$2,366,222	0.7%	$0	0.0%	$0	0.0%
Rid-A-Fridge (Refrigerator)	130	0.6%	796,657	0.6%	11,153,198	0.7%	14.0	31.6	$2,464,891	0.7%	$78,060	0.1%	$78,060	0.4%

Table A13 TRC Measure Values (cont'd)														
Measure	Program Demand (kW)	%	Program Energy (kWh 1st Yr)	%	Program Energy (kWh - Life)	%	Average Measure Life (Yrs)	TRB/TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
VFD Pump for Chilled Water / Condenser Water	156	0.8%	608,893	0.5%	9,133,393	0.6%	15.0	6.2	$2,373,218	0.7%	$381,650	0.3%	$89,800	0.5%
TV	140	0.7%	1,159,630	0.9%	6,957,781	0.4%	6.0	0.8	$1,542,587	0.5%	$1,902,375	1.4%	$160,200	0.9%
Split Systems: VRF	50	0.2%	412,621	0.3%	6,189,321	0.4%	15.0	2.3	$1,233,551	0.4%	$528,349	0.4%	$179,544	1.0%
Domestic Water Booster Packages	37	0.2%	386,667	0.3%	5,800,004	0.4%	15.0	2.5	$1,088,062	0.3%	$437,000	0.3%	$69,680	0.4%
Kitchen Ventilation	51	0.2%	297,708	0.2%	4,465,623	0.3%	15.0	5.4	$990,618	0.3%	$184,500	0.1%	$72,450	0.4%
Package Units: 15% Better Than Code	64	0.3%	287,475	0.2%	4,312,131	0.3%	15.0	3.9	$1,058,291	0.3%	$271,668	0.2%	$50,865	0.3%
Window Film	92	0.4%	356,853	0.3%	3,568,527	0.2%	10.0	2.9	$952,307	0.3%	$329,324	0.2%	$58,946	0.3%
LED Exit Signs	27	0.1%	245,947	0.2%	3,564,029	0.2%	14.5	25.6	$696,399	0.2%	$27,180	0.0%	$38,095	0.2%
ECM Fan Coil	27	0.1%	233,807	0.2%	3,507,110	0.2%	15.0	2.7	$690,480	0.2%	$255,990	0.2%	$67,365	0.4%
Heat Pump Water Heater	42	0.2%	327,346	0.3%	3,273,458	0.2%	10.0	1.7	$690,978	0.2%	$410,400	0.3%	$59,600	0.3%
Clothes Washer	54	0.3%	281,954	0.2%	3,101,499	0.2%	11.0	0.6	$739,710	0.2%	$1,172,600	0.9%	$72,080	0.4%
Residential Custom	64	0.3%	370,153	0.3%	2,792,372	0.2%	7.5	1.5	$668,482	0.2%	$445,408	0.3%	$445,408	2.4%
Room Occupancy Sensors	34	0.2%	340,552	0.3%	2,724,419	0.2%	8.0	4.6	$560,786	0.2%	$122,420	0.1%	$122,495	0.7%
Solar Water Heater Tune Up	61	0.3%	521,941	0.4%	2,609,704	0.2%	5.0	0.9	$574,208	0.2%	$616,800	0.5%	$205,600	1.1%
Whole House Fan	41	0.2%	127,702	0.1%	2,554,036	0.2%	20.0	11.5	$635,422	0.2%	$55,200	0.0%	$34,500	0.2%
Clothes Dryer	36	0.2%	180,590	0.1%	2,528,253	0.2%	14.0	1.0	$600,485	0.2%	$624,000	0.5%	$40,340	0.2%
Fluorescent Delamping	21	0.1%	171,064	0.1%	2,394,897	0.1%	14.0	46.8	$485,972	0.1%	$10,392	0.0%	$6,468	0.0%
Showerhead	289	1.4%	457,653	0.4%	2,288,265	0.1%	5.0	11.4	$1,047,682	0.3%	$92,157	0.1%	$91,414	0.5%

Table A13 TRC Measure Values (cont'd)														
Measure	Program Demand (kW)	%	Program Energy (kWh 1st Yr)	%	Program Energy (kWh - Life)	%	Average Measure Life (Yrs)	TRB/ TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
LED Refrigerated Case Lighting	26	0.1%	188,699	0.2%	2,093,592	0.1%	11.1	0.0	$444,449	0.1%	$0	0.0%	$54,836	0.3%
Faucet Aerator	166	0.8%	363,276	0.3%	1,816,379	0.1%	5.0	9.6	$685,016	0.2%	$71,304	0.1%	$68,390	0.4%
Dehumidifiers	17	0.1%	145,795	0.1%	1,749,541	0.1%	12.0	4.6	$355,040	0.1%	$78,000	0.1%	$8,020	0.0%
Retro-Commissioning	8	0.0%	109,429	0.1%	1,641,435	0.1%	15.0	0.0	$289,778	0.1%	$31,107,938	22.9%	$36,881	0.2%
Residential A/C	364	1.8%	1,612,058	1.3%	1,612,058	0.1%	1.0	0.2	$283,708	0.1%	$1,462,500	1.1%	$470,875	2.5%
Rid-A-Fridge (Freezer)	16	0.1%	98,545	0.1%	1,379,633	0.1%	14.0	31.6	$304,903	0.1%	$9,660	0.0%	$9,660	0.1%
Central AC Retrofit	23	0.1%	89,823	0.1%	1,347,349	0.1%	15.0	0.7	$350,247	0.1%	$468,000	0.3%	$39,000	0.2%
Advance Power Strips	28	0.1%	250,836	0.2%	1,254,181	0.1%	5.0	2.3	$273,770	0.1%	$116,866	0.1%	$111,737	0.6%
Heat Pump	6	0.0%	106,010	0.1%	1,060,098	0.1%	10.0	1.0	$190,483	0.1%	$195,033	0.1%	$8,901	0.0%
Window AC w/ Trade In	29	0.1%	106,755	0.1%	960,797	0.1%	9.0	1.1	$270,617	0.1%	$256,050	0.2%	$28,525	0.2%
VFD Pool Pumps	2	0.0%	86,514	0.1%	926,003	0.1%	10.7	1.4	$151,723	0.0%	$106,500	0.1%	$20,675	0.1%
Air Purifiers	10	0.1%	89,330	0.1%	803,968	0.0%	9.0	3.2	$168,206	0.1%	$52,400	0.0%	$5,600	0.0%
ECM Refrigeration	5	0.0%	48,568	0.0%	728,513	0.0%	15.0	5.5	$140,702	0.0%	$25,452	0.0%	$10,710	0.1%
Package Units: VRF	6	0.0%	45,336	0.0%	680,044	0.0%	15.0	0.9	$141,677	0.0%	$150,305	0.1%	$18,675	0.1%
Solar Attic Fan	0	0.0%	27,020	0.0%	540,400	0.0%	20.0	2.5	$73,359	0.0%	$29,250	0.0%	$9,750	0.1%
Anti-Sweat Heater Controls	4	0.0%	37,931	0.0%	455,167	0.0%	12.0	19.0	$90,463	0.0%	$4,770	0.0%	$5,300	0.0%
Steam Cooker	8	0.0%	35,850	0.0%	430,205	0.0%	12.0	7.3	$109,759	0.0%	$15,000	0.0%	$1,500	0.0%
VFD - AHU	6	0.0%	26,771	0.0%	401,565	0.0%	15.0	4.5	$98,084	0.0%	$21,715	0.0%	$3,425	0.0%
Case Night Cover	0	0.0%	31,388	0.0%	156,939	0.0%	5.0	1.7	$26,083	0.0%	$14,994	0.0%	$7,820	0.0%
Submetering (Condo)	5	0.0%	19,251	0.0%	154,006	0.0%	8.0	0.6	$43,359	0.0%	$69,000	0.1%	$20,700	0.1%

Table A13 TRC Measure Values (cont'd)														
Measure	Program Demand (kW)	%	Program Energy (kWh 1st Yr)	%	Program Energy (kWh - Life)	%	Average Measure Life (Yrs)	TRB/ TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
Smart Thermostats	0	0.0%	11,038	0.0%	121,413	0.0%	11.0	1.0	$18,576	0.0%	$18,400	0.0%	$4,600	0.0%
Soundbar	1	0.0%	12,162	0.0%	85,133	0.0%	7.0	1.1	$15,590	0.0%	$14,085	0.0%	$2,970	0.0%
Commercial A/C	17	0.1%	76,512	0.1%	76,512	0.0%	1.0	0.2	$13,466	0.0%	$67,200	0.0%	$22,425	0.1%
CEE Tier 1+ Motors	2	0.0%	3,777	0.0%	56,653	0.0%	15.0	1.3	$23,499	0.0%	$17,745	0.0%	$825	0.0%
Reach-In Refrigerator Solid Door	0	0.0%	4,035	0.0%	48,422	0.0%	12.0	0.4	$9,836	0.0%	$26,000	0.0%	$2,150	0.0%
Freezer	0	0.0%	2,376	0.0%	40,392	0.0%	17.0	0.1	$7,654	0.0%	$51,200	0.0%	$1,920	0.0%
Dishwasher	0	0.0%	3,310	0.0%	36,406	0.0%	11.0	0.1	$7,306	0.0%	$54,400	0.0%	$4,080	0.0%
Ice Machine	0	0.0%	2,458	0.0%	29,502	0.0%	12.0	1.2	$5,995	0.0%	$5,000	0.0%	$200	0.0%
Reach-In Freezer Solid Door	0	0.0%	2,406	0.0%	28,875	0.0%	12.0	0.9	$5,858	0.0%	$6,500	0.0%	$375	0.0%
Power Switch	1	0.0%	5,533	0.0%	27,664	0.0%	5.0	4.3	$6,026	0.0%	$1,410	0.0%	$1,402	0.0%
Refrigerator	0	0.0%	1,808	0.0%	25,316	0.0%	14.0	0.3	$5,583	0.0%	$16,000	0.0%	$5,000	0.0%
Fluorescent T8 to T8 Low Wattage	0	0.0%	530	0.0%	7,416	0.0%	14.0	1.0	$1,870	0.0%	$1,800	0.0%	$60	0.0%
Energy Audit	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$5,000	0.0%	$5,000	0.0%
Accounting	0	0.0%	0	0.0%	0	0.0%	0.0	0.0	$0	0.0%	$443,231	0.3%	$1,208,445	6.5%
Total	**20,473**	**100.0%**	**123,583,370**	**100.0%**	**1,653,067,787**	**100.0%**	**13.4**	**2.4**	**$333,347,497**	**100.0%**	**$136,067,145**	**100.0%**	**$18,667,919**	**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 ($)**
Retro-Commissioning	$31,107,938	$31,107,938	$0
Variable Refrigerant Flow Air Conditioners	$19,117,042	$9,558,521	$9,558,521
Custom Lighting	$14,408,554	$14,408,554	$0
LED Lighting	$13,206,277	$11,296,100	$1,910,177
LED Linear	$11,846,950	$9,477,560	$2,369,390
Chillers	$10,645,091	$2,148,356	$8,496,734
Solar Water Heating	$9,507,000	$9,507,000	$0
Refrigerator w/ Trade In	$5,683,200	$1,704,960	$3,978,240
Custom HVAC	$2,777,008	$2,777,008	$0
Custom	$2,269,529	$2,269,529	$0
TV	$1,902,375	$1,902,375	$0
Residential A/C	$1,462,500	$1,462,500	$0
LED Omni Directional	$1,304,590	$1,043,672	$260,918
Clothes Washer	$1,172,600	$234,520	$938,080
LED Specialty	$1,076,376	$866,996	$209,380
Clothes Dryer	$624,000	$124,800	$499,200
Solar Water Heater Tune Up	$616,800	$616,800	$0
Custom - High Efficiency Lighting	$532,223	$532,223	$0
Split Systems: VRF	$528,349	$264,175	$264,175
Central AC Retrofit	$468,000	$117,000	$351,000
Custom - EMS TBD	$448,500	$448,500	$0
Residential Custom	$445,408	$445,408	$0
Accounting	$443,231	$239,111	$204,120
Domestic Water Booster Packages	$437,000	$327,750	$109,250
Heat Pump Water Heater	$410,400	$410,400	$0
VFD Pump for Chilled Water / Condenser Water	$381,650	$95,413	$286,238
Window Film	$329,324	$82,331	$246,993
Split Systems: 15% Better Than Code	$316,624	$132,442	$184,182

Table A14 (cont'd) Total vs. Incremental Measure Cost			
Measure	Measure Total Cost ($)	Measure Incremental Cost ($)	Difference ($)
Package Units: 15% Better Than Code	$271,668	$54,334	$217,334
Window AC w/ Trade In	$256,050	$51,210	$204,840
ECM Fan Coil	$255,990	$255,990	$0
Heat Pump	$195,033	$195,033	$0
Kitchen Ventilation	$184,500	$184,500	$0
Package Units: VRF	$150,305	$75,153	$75,153
Room Occupancy Sensors	$122,420	$122,420	$0
Advance Power Strips	$116,866	$116,866	$0
VFD Pool Pumps	$106,500	$85,200	$21,300
Showerhead	$92,157	$92,157	$0
Rid-A-Fridge (Refrigerator)	$78,060	$78,060	$0
Dehumidifiers	$78,000	$15,600	$62,400
Faucet Aerator	$71,304	$71,304	$0
Submetering (Condo)	$69,000	$69,000	$0
Commercial A/C	$67,200	$67,200	$0
Whole House Fan	$55,200	$55,200	$0
Dishwasher	$54,400	$10,880	$43,520
Air Purifiers	$52,400	$10,480	$41,920
Freezer	$51,200	$10,240	$40,960
Solar Attic Fan	$29,250	$29,250	$0
LED Exit Signs	$27,180	$27,180	$0
Reach-In Refrigerator Solid Door	$26,000	$11,366	$14,634
ECM Refrigeration	$25,452	$25,452	$0
VFD - AHU	$21,715	$5,429	$16,286
Smart Thermostats	$18,400	$18,400	$0
CEE Tier 1+ Motors	$17,745	$887	$16,858
Refrigerator	$16,000	$3,200	$12,800
Steam Cooker	$15,000	$4,265	$10,736
Case Night Cover	$14,994	$14,994	$0
Soundbar	$14,085	$14,085	$0
Fluorescent Delamping	$10,392	$10,392	$0
Rid-A-Fridge (Freezer)	$9,660	$9,660	$0
Reach-In Freezer Solid Door	$6,500	$2,141	$4,359

Table A14 (cont'd) Total vs. Incremental Measure Cost			
Measure	**Measure Total Cost ($)**	**Measure Incremental Cost ($)**	**Difference ($)**
Energy Audit	$5,000	$5,000	$0
Ice Machine	$5,000	$532	$4,468
Anti-Sweat Heater Controls	$4,770	$4,770	$0
Fluorescent T8 to T8 Low Wattage	$1,800	$36	$1,764
Power Switch	$1,410	$1,410	$0
Peer Group Comparison	$0	$0	$0
LED Refrigerated Case Lighting	$0	$0	$0
Total	**$136,067,145**	**$105,411,217**	**$30,655,928**

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	PY18 Budget (R7)	Percent Unspent	Unspent	Percent Unspent
BEEM Operations	$889,243.39	$889,460.33	99.98%	$216.94	0.02%
BEEM Incentives	$3,815,295.14	$3,817,385.44	99.95%	$2,090.30	0.05%
Total BEEM	**$4,704,538.53**	**$4,706,845.77**	**99.95%**	**$2,307.24**	**0.05%**

CBEEM

Table B2 CBEEM Program Expenditures					
	Total Expenditures	PY18 Budget (R7)	Percent Unspent	Unspent	Percent Unspent
CBEEM Operations	$599,319.30	$738,538.87	81.15%	$139,219.57	18.85%
CBEEM Incentives	$4,631,695.33	$4,635,920.67	99.91%	$4,225.34	0.09%
Total CBEEM	**$5,231,014.63**	**$5,374,459.54**	**97.33%**	**$143,444.91**	**2.67%**

BESM

Table B3 BESM Program Expenditures					
	Total Expenditures	PY18 Budget (R7)	Percent Unspent	Unspent	Percent Unspent
BESM Operations	$26,079.53	$63,088.97	41.34%	$37,009.44	58.66%
BESM Incentives	$213,436.27	$217,033.00	98.34%	$3,596.73	1.66%
Total BESM	**$239,515.80**	**$280,121.97**	**85.50%**	**$40,606.17**	**14.50%**

BHTR

Table B4 BHTR Program Expenditures					
-	Total Expenditures	PY18 Budget (R7)	Percent Unspent	Unspent	Percent Unspent
BHTR Operations	$446,179.33	$450,294.08	99.09%	$4,114.75	0.91%
BHTR Incentives	$2,632,266.05	$2,633,654.61	99.95%	$1,388.56	0.05%
Total BHTR	**$3,078,445.38**	**$3,083,948.69**	**99.82%**	**$5,503.31**	**0.18%**

APPENDIX C - RESIDENTIAL PROGRAM

Expenditures

REEM

Table C1 REEM Program Expenditures					
-	Total Expenditures	PY18 Budget (R7)	Percent Unspent	Unspent	Percent Unspent
REEM Operations	$1,104,451.74	$1,104,478.89	100.00%	$27.15	0.00%
REEM Incentives	$5,783,008.90	$6,012,600.00	96.18%	$229,591.10	3.82%
Total REEM	**$6,887,460.64**	**$7,117,078.89**	**96.77%**	**$229,618.25**	**3.23%**

CREEM

Table C2 CREEM Program Expenditures					
-	Total Expenditures	PY18 Budget (R7)	Percent Unspent	Unspent	Percent Unspent
CREEM Operations	$55,930.57	$55,944.59	99.97%	$14.02	0.03%
CREEM Incentives	$85,550.00	$172,650.00	49.55%	$87,100.00	50.45%
Total CREEM	**$141,480.57**	**$228,594.59**	**61.89%**	**$87,114.02**	**38.11%**

RESM

Table C3 RESM Program Expenditures					
-	Total Expenditures	PY18 Budget (R7)	Percent Unspent	Unspent	Percent Unspent
RESM Operations	$174,325.87	$174,381.86	99.97%	$55.99	0.03%
RESM Incentives	$672,650.00	$674,762.50	99.69%	$2,112.50	0.31%
Total RESM	**$846,975.87**	**$849,144.36**	**99.74%**	**$2,168.49**	**0.26%**

RHTR

Table C4 RHTR Program Expenditures					
-	Total Expenditures	PY18 Budget (R7)	Percent Unspent	Unspent	Percent Unspent
RHTR Operations	$259,169.21	$259,273.78	99.96%	$104.57	0.04%
RHTR Incentives	$834,016.98	$838,677.47	99.44%	$4,660.49	0.56%
Total RHTR	**$1,093,186.19**	**$1,097,951.25**	**99.57%**	**$4,765.06**	**0.43%**

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, including: an increase in the federal standard for efficiency of a measure; new information from field tests; altered qualification criteria; a 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 PY18 TRM was updated in close coordination with Program evaluators and received final, signed approval by the PUC in August 2018. The PY18 TRM is available as a PDF in Attachment D, and also at the following link: https://hawaiienergy.com/files/about/information-and-reports/PY18_-_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 Hawaiʻi specific data, when and where available. Where Hawaiʻi 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, include but are not limited to:

- *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 legacy measures were initially drawn from the KEMA Evaluation Report for 2005 through 2007 since this report was the most recent information available on specific markets at the time of Program commencement. 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 reputable 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[12]). 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 county, and are listed in **Table D1**.

Table D1
County System 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 Benefit-to-Cost 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 84% for estimates. The values used in PY18 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 Energy Services and Maintenance	0.95
BHTR	Business Hard-to-Reach (General)	0.99
BHTR	Multifamily Direct Install	1.00
REEM	Residential Energy Efficiency Measures (General)	0.79
REEM	Upstream LED	0.575
REEM	Peer Group Comparison	1.00
CREEM	Custom Residential Energy Efficiency Measures	0.65
RESM	Residential Energy Services and Maintenance	0.92
RHTR	Residential Hard-to-Reach	1.00
	Composite NTG Ratio	**0.84**

[12] 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 25 year utility avoided cost.

Proxy Avoided Cost Developed

The Program's avoided cost is calculated based on the PY15 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 25-year avoided cost list in **Table D3**.

Table D3
25 Year Utility Avoided Cost

			Discount Rate	Utility Avoided Cost	
			6%		
PY	**Year**	**Measure Life**	**NPV Multiplier**	**$/kW/yr.**	**$/kWh/yr.**
PY18	2018	1	1		$0.176
PY19	2019	2	0.94		$0.181
PY20	2020	3	0.89	$904	$0.187
PY21	2021	4	0.84	$986	$0.192
PY22	2022	5	0.79	$856	$0.198
PY23	2023	6	0.75	$750	$0.204
PY24	2024	7	0.70	$663	$0.210
PY25	2025	8	0.67	$590	$0.216
PY26	2026	9	0.63	$527	$0.223
PY27	2027	10	0.59	$474	$0.230
PY28	2028	11	0.56	$1,020	$0.236
PY29	2029	12	0.53	$1,066	$0.244
PY30	2030	13	0.50	$964	$0.251
PY31	2031	14	0.47	$875	$0.258
PY32	2032	15	0.44	$795	$0.266
PY33	2033	16	0.42	$724	$0.274
PY34	2034	17	0.39		$0.282
PY35	2035	18	0.37		$0.291
PY36	2036	19	0.35		$0.300
PY37	2037	20	0.33		$0.308
PY38	2038	21	0.31		$0.318
PY39	2039	22	0.29		$0.327
PY40	2040	23	0.28		$0.337
PY41	2041	24	0.26		$0.347
PY42	2042	25	0.25		$0.358

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

Attachment A: Revised Avoided Costs

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

HECO

P2_100vs110

Year	Energy $/MWH	Capacity $/KY-Yr
2014	192	0
2015	196	0
2016	230	0
2017	233	0
2018	243	0
2019	253	0
2020	260	1,189
2021	273	1,298
2022	295	1,126
2023	297	987
2024	314	872
2025	326	776
2026	328	694
2027	346	624
2028	357	1,342
2029	358	1,403
2030	373	1,269
2031	391	1,151
2032	397	1,046
2033	420	953
	Levelized	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 D5
PY13 System Level Demand Impacts - kW

Oʻahu	16,481	76.4%
Hawaiʻi	2,469	11.5%
Maui	2,597	12.0%
Molokaʻi	8	0.0%
Lānaʻi	8	0.0%
Total	21,563	100.0%

APPENDIX E – ANNUAL REPORT TABLE CROSS-WALK (PY18 TO PY17 & PY16)

PY18 Tables with corresponding PY16 & PY17 References

	PY 18 List of Tables	PY 17 Table Reference	PY16 Table Reference
Program Overview, Objectives & Organization	Table 1	Table 1	1
	Table 2	Table 2	2
	Table 3	Table 3	3
Performance indicators & Results	Table 4	Table 4	4
	Table 5	Table 5	5
	Table 6	Table 6	6
	Table 7	Table 7	7
	Table 8 (New)		
	Table 9	Table 8	8
	Table 10	Table 9	9
	Table 11	Table 10	10
	Table 12	Table 11	11
	Table 13	Table 12	12
	Table 14	Table 13	13
Budget Progression & Expenditures	Table 15	Table 14	14
	Table 16	Table 15	15
	Table 17	Table 16	16
Portfolio Impacts	Table 18	Table 17	17
	Table 19	Table 18	18
	Table 20	Table 19	19
	Table 21	Table 20	20
	Table 22	Table 21	21
	Table 23	Table 22	22
	Table 24	Table 23	23
	Table 25	Table 24	24
	Table 26	Table 25	25

	PY 18 List of Tables	PY17 Table Reference	PY16 Table Reference
Portfolio Impacts (continued)	Table 27	Table 26	26
	Table 28	Table 27	27
	Table 29	Table 28	28
Business Program	Table 30	Table 29	29
	Table 31	Table 30	30
	Table 32	Table 31	31
	Table 33	Table 32	32
	Table 34	Table 33	None
	Table 35	Table 34	33
	Table 36	Table 35	34
Residential Program	Table 37	Table 36	35
	Table 38	Table 37	36
	Table 39	Table 38	37
	Table 40	Table 39	38
	Table 41	Table 40	39
	Table 42	Table 41	40
	Figure 12	Figure 12	41
	Table 43	Table 42	42
	Table 44	Table 43	43
	Table 45	Table 44	44
	Table 46	Table 45	45
	Table 47	Table 46	None
	Table 48	Table 47	46
	Table 49	Table 48	47
Transformational Program	Table 50	Table 49	48

PY 18 List of Tables	PY17 Table Reference	PY16 Table Reference
Table A1	Table A1	Table A1
Table A2	Table A2	Table A2
Table A3	Table A3	Table A3
Table A4	Table A4	Table A4
Table A5	Table A5	Table A5
Table A6	Table A6	Table A6
Table A7	Table A7	Table A7
Table A8	Table A8	Table A8
Table A9	Table A9	Table A9
Table A10	Table A10	Table A10
Table A11	Table A11	Table A11
Table A12	Table A12	Table A12
Table A13	Table A13	Table A13
Table A14	Table A14	Table A14
Table B1	Table B1	Table B1
Table B2	Table B2	Table B2
Table B3	Table B3	Table B3
Table B4	Table B4	Table B4

PY 18 List of Tables	PY17 Table Reference	PY16 Table Reference
Table C1	Table C1	Table C1
Table C2	Table C2	Table C2
Table C3	Table C3	Table C3
Table C4	Table C4	Table C4
Table D1	Table D1	Table D1
Table D2	Table D2	Table D2
Table D3	Table D3	Table D3
Table D4	Table D4	Table D4
Table D5	Table D5	Table D5

ATTACHMENT LIST

Attachment A: Acronym List

A list of the commonly used Hawaiʻi Energy acronyms

Attachment B: PY18 Program Participation List

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

Attachment C: PY18 Annual Plan

The Program's annual plan, which provides Leidos' strategies and plans for administration and delivery of the Hawaiʻi Energy portfolio for PY18 (July 1, 2018 to June 30, 2019).

Attachment D: PY18 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: PY18 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.