



*Pacific Gas and
Electric Company®*

2017 ENERGY EFFICIENCY ANNUAL REPORT



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Executive Summary

Serving residential, commercial, agricultural, and other customers across the state, Pacific Gas and Electric Company (PG&E) delivers energy efficiency (EE) solutions that empower customers to eliminate unnecessary energy use, reduce their carbon footprint, and save money. In 2017, PG&E continued its role as a leader in EE, delivering a dynamic and cost-effective portfolio of programs.

PG&E serves the diverse needs of more than 15 million customers across our 70,000 square-mile service territory through 10 statewide programs and nearly 100 subprograms.¹ 2017 marked the continuation of ambitious EE partnerships and successful programs. PG&E focused on key initiatives to drive deep energy savings and position the state to meet its ambitious EE and carbon reduction goals. These initiatives are described in the following sections.

Transitioning to a New Energy Efficiency Paradigm

In 2017, PG&E engaged in foundational work to meet the California Public Utility Commission's (Commission's or CPUC's) new third-party EE program requirements for PG&E's EE portfolio in 2018 and beyond. This work focused on preparations for the forthcoming third-party program solicitations as described in PG&E's Business Plan.

Notably, PG&E filed its EE Solicitation Plan that serves as a comprehensive guidebook of the third-party program solicitation process for potential EE industry stakeholders interested in competing to offer their goods and services. The EE Solicitation Plan proposed a solicitation timeline that continues to be refined to meet Commission direction and market needs. PG&E also delivered trainings and workshops to interested EE industry stakeholders to help prepare the marketplace for the changing EE landscape.

In addition, PG&E partnered with the other investor owned utilities (IOUs) to prepare for upcoming statewide solicitations and operationalization of the new statewide structure, laying the groundwork for statewide programs in 2018 and beyond.

PG&E Exceeded 2017 CPUC- Adopted Savings Goals and Delivered a Cost-Effective EE Portfolio

In 2017, PG&E exceeded its goals:

- 130% of its gross electric energy savings goal (1,487 gross annual GWh)
- 166% of its gross electric demand reduction goal (320 gross summer peak MW)
- 179% of its gross gas savings goal (33 gross annual million therms)

Codes and Standards (C&S) Advocacy exceeded its 2017 goals:

- 165% of its net electric goal (834 net annual GWh)
- 145% of its net electric demand reduction goal (153 net summer peak MW)
- 234% of its net gas savings goal (13 million therms)

PG&E's total 2017 EE portfolio was cost-effective, at 1.84 TRC and 5.33 PAC (includes net C&S with 5% market spillover).

PG&E's EE programs avoided 884,090 tons of carbon dioxide in 2017, continuing as a strong partner in helping reduce California's greenhouse gas emissions.

¹ Note that some individual subprograms are called "programs" in their CEDARS name, but this report refers to them as subprograms.



Achieving Savings through Energy Management Technologies and Connected Homes

In 2017, PG&E pursued an expansion of residential energy management technologies and solutions for EE customers. The PG&E Marketplace² tool was expanded to include smart thermostats, connected home products, and connected applications, which help customers manage their energy use through data provided by PG&E's Share My Data.

In its focus on smart thermostats, PG&E launched a \$50 smart thermostat rebate for customers. Smart thermostats were also a popular offering in bids in response to the Request for Proposals (RFP) for the Residential Pay for Performance (P4P) subprogram. PG&E also commissioned a study to inform how smart thermostats can interact with other products to provide energy-efficiency and demand-response capabilities.

To explore connected homes opportunities, PG&E worked with the Electric Power Research Institute (EPRI) on a connected homes study and initiated conversations with Amazon in 2017 about creating energy-related skills for Alexa. The Alexa skills will be developed in 2018. PG&E also contracted with IFTTT (if this, then that) in 2017 to provide a landing page and curated applets for energy-related actions. Applets are being developed in 2018.

Bringing Energy Efficiency and Training Opportunities to Disadvantaged Communities

PG&E worked closely with internal and external stakeholders to ensure that PG&E's Residential EE subprograms support all Californians. PG&E increased the focus, funding, and eligible measures for its multifamily offerings, direct-install subprograms for moderate-income customers, and mobile and manufactured home offerings. PG&E also established an independent Multifamily Single Point of Contact (SPOC), which will coordinate EE, income qualified, and other energy resources (demand response, distributed generation, rate options, and electric vehicles) for multifamily building owners.

PG&E leverages Workforce Education and Training (WE&T) efforts that train disadvantaged workers for careers in EE. The Connections subprogram, which provides teaching resources for K-12 and college instructors as well as EE and green-career awareness and exploration subprograms for students, targets some schools in disadvantaged communities. In 2017, The PEAK subprogram facilitated several partnerships that focused on disadvantaged communities including CSU East Bay Institute for STEM Education, which facilitates the CIRCLE Labs after-school programming.

In 2017, PG&E continued to collaborate with the Alameda County Workforce Development Board (ACWDB), the Northwest Energy Efficiency Council (NEEC), and local facility management professionals to support qualified but unemployed building operations professionals toward earning an industry-recognized Building Operator Certification. Looking ahead, PG&E will lead the Career and Workforce Readiness subprogram, which will focus on extending EE knowledge, skills, and career opportunities to disadvantaged workers.

² <https://marketplace.pge.com/>



Normalized Metered Energy Consumption (NMEC) and Residential Pay for Performance (P4P)

PG&E progressed in contributing to the development of methods to measure savings at the meter, an approach known as Normalized Metered Energy Consumption (NMEC). Unlike traditional methods for estimating energy savings, NMEC uses actual energy use to estimate the savings resulting from EE actions. A flurry of NMEC activity occurred in 2017 with the first year of the performance period of the Commercial Whole Building Demonstration completed, the launch of the Residential P4P pilot, the approval for the launch of the Industrial Strategic Energy Management subprogram, and the launch of an expanded On-Bill Financing (OBF) offering. These activities represent important milestones for the NMEC approach to savings estimation, and PG&E looks forward to sharing its learnings to develop best practices for NMEC statewide and accelerate the adoption of these approaches moving forward.

Extending the Reach of Customers' Energy Efficiency Dollars through Financing

PG&E's EE financing subprograms continues to play a critical role in the overall portfolio in 2017 by allowing customers to pursue large, comprehensive efficiency retrofit projects that might not have otherwise been financially feasible. In 2017, the OBF subprogram funded 553 loans totaling more than \$24 million. The subprogram continues to experience significant growth in applications and financed projects, with a 39% increase in total loan volume and a 22% increase in small and medium-sized business (SMB) loans. 2017 work also included an expansion of loan terms available to multifamily buildings and customers that can now obtain a loan of up to \$2 million per site for their project.

Strategic Energy Management

Strategic Energy Management (SEM) is a holistic, long-term, whole facility approach that uses advanced implementation, measurement, and verification services and tools to determine energy savings from all subprogram activities at a facility, including capital projects, maintenance and operation improvements, as well as retro-commissioning.

In 2017, PG&E completed a rigorous competitive bidding process for selecting third-party vendors with innovative SEM outreach approaches. The final selection concluded in two different market strategies utilizing the SEM guidelines as defined by the IOUs and CPUC. The two target markets for this subprogram are Food Processing and Manufacturing. The two selected vendors will be announced in 2018 and will operate their subprograms from 2018 to 2020.

Targeted Demand-Side Management (TDSM) Initiative

PG&E's Targeted Demand-Side Management (TDSM) Initiative is a multi-year campaign focused on leveraging existing demand-side subprograms, including EE, to reduce peak load on specific substations leading to deferral or reduction in distribution capital spending. PG&E's Government and Community Partnerships (GCP) Program significantly contributed to the TDSM initiative's goal achievement by way of the geographically-focused nature of GCP-led Regional Direct Install subprograms. PG&E's Commercial EE team provided knowledge and market support to prepare for the upcoming Oakland Clean Energy Initiative (OCEI), which will upgrade



existing substation infrastructure and develop new clean energy resources to replace a fossil-fuel plan in Oakland. The OCEI Request for Offers (RFO) was released in April 2018.

Conclusion

PG&E's 2017 Annual Report describes the full set of programs delivering cost-effective energy savings for our customers. PG&E will continue to deliver on its commitment to customers and its commitment to California to deliver cost-effective EE and carbon reduction goals through innovative program and pilot strategies and excellence in program administration.



Annual Report Data

D.15-10-028 established annual energy savings and demand reduction targets for the 2017 investor-owned utilities (IOU) resource programs on a gross basis and Codes and Standards Advocacy on a net basis. In 2017, PG&E achieved 1,487 gross GWh which is 130 percent of its electric energy savings goal; 320 gross summer peak MW which is 166 percent of its electric demand reduction goal; and 33 million gross therms which is 179 percent of its gas savings goal. In addition to helping customers save energy and money, PG&E's portfolio of EE programs continued to contribute significantly to the state's goal of reducing greenhouse gas (GHG) emissions, with avoided annual emissions of 884,090 tons of carbon dioxide. PG&E's total portfolio was cost-effective, achieving a 1.84 Total Resource Cost (TRC) ratio³ and 5.33 Program Administrator Cost (PAC) ratio, including Codes and Standards (C&S) advocacy. Please see Section 4 for more specifics on PG&E's portfolio cost-effectiveness.

The C&S Advocacy program achieved 165 percent of its net electric goal, (834 net annual GWh), 145 percent of its net electric demand reduction goal (153 net summer peak MW), and 234 percent of its net therm goal (13 million therms).

Total 2017 portfolio gross energy savings shown in this report include savings associated with PG&E's deemed savings subprograms, comprised of Database for Energy Efficient Resources (DEER) and final approved work paper values from the 2017 customer energy savings projects; savings associated with custom projects that were installed in 2017; savings associated with behavioral subprograms implemented in 2017; savings for the Bay Area Regional Energy Network (BayREN) and Marin Clean Energy (MCE) as reported in their 2017 Annual Reports; and Energy Savings Assistance Program (ESA) savings.

D.09-09-047 defined and D.12-11-015 clarified the ten percent utility administrative cost cap, the six percent marketing cost cap, the four percent EM&V cost cap and the twenty percent direct implementation non-incentive (DINI) target. The 2017 EM&V budget is four percent of the program portfolio, including BayREN, MCE and statewide Marketing, Education and Outreach (ME&O). Statewide ME&O is excluded from the marketing cap.⁴ PG&E reports its progress against these caps and targets in quarterly reports posted on the CPUC's California Energy Data and Reporting System (CEDARS)⁵ along with quarterly fund shifting reports. PG&E's monthly expenditure and savings reports are also posted on EE Stats.

³ Includes net C&S. All savings values include 5% market spillover in cost-effectiveness calculations per D.12-11-015 (OP 37) including C&S. Excludes ESA, Bay Area Regional Energy Network (BayREN), Marin Clean Energy (MCE), and Statewide Emerging Technologies program costs and benefits. The Financing Program OBF Loan Pool amounts (loans issued and repaid) of \$8.3M for 2017 are excluded per D.09-09-047, p.288.

² D.13-12-038, p. 82.

⁵ <https://cedars.sound-data.com/>



Program Descriptions and Strategies – Statewide Programs

In 2017, the IOUs administered 10 statewide programs that covered every market sector and customer type, across all technology families, and used a variety of market intervention strategies from upstream rebates – targeted at manufacturers and distributors to buy-down the cost of the product for the end-use customer – to midstream and downstream incentives. These programs support California’s Long-Term Energy Efficiency Strategic Plan goal to provide a more integrated EE experience for customers and to provide customers with access to information and greater financing opportunities.

This section describes the successful strategies and accomplishments employed by PG&E in 2017 for the following statewide programs:

1. Residential
2. Commercial
3. Industrial
4. Agricultural
5. Lighting
6. Codes and Standards
7. Emerging Technologies
8. Workforce Education and Training
9. Integrated Demand-Side Management
10. Financing

Residential Program

PG&E's vision for the Residential sector is to deliver a portfolio that will achieve deep energy savings and robust grid benefits through focused customer engagement, data-driven subprograms that leverage market actors, and strong partnerships.

PG&E's current Residential subprograms offer a robust suite of incentives, services, and tools aimed at helping all customers save energy and money, while meeting our portfolio goals.

Current subprograms engage customers and other market actors through the following channels:

- Built environments such as whole home upgrades, Heating, Ventilation and Air Conditioning (HVAC), and new construction
- Engaging retail and manufacturers on more efficient plug loads and appliances
- Behavioral and home energy management tools and initiatives

In 2017, PG&E began incorporating NMEC and customer targeting using energy meter data to deepen energy savings and ensure that our subprograms drive grid benefits.

Key Initiatives

PG&E's Residential Program priorities described below are based on overall program objectives and energy savings goals.

Residential Pay for Performance

PG&E launched the Residential Pay for Performance (P4P) pilot subprogram, which was authorized under AB 802. The P4P model enables measurement of energy savings at the meter and aims to achieve persistent savings through an on-going relationship between customers and their contractors. In 2017, the subprogram completed the first solicitation for third-party aggregators, engaged a firm to manage the CalTRACK baseline tool, and launched the second solicitation for third-party aggregators. The subprogram has the potential to transform EE into a reliable grid resource, and PG&E is seeing interest in the tool from around the country.

Disadvantaged Communities

PG&E has worked closely with internal and external stakeholders to ensure that our Residential EE subprograms support all Californians. PG&E has increased the focus, funding, and eligible measures for multifamily subprogram offerings, direct install subprograms for moderate-income customers, and mobile and manufactured homes.

PG&E's Key Residential Program Goals

- Deliver residential energy efficiency programs that are leveraged as a grid resource
- Make energy efficiency accessible through programs and financing offerings
- Increase access to and use of energy use data
- Support state policy objectives around residential new construction
- Transform markets to create energy efficiency opportunities for customers





The Moderate Income Direct Install (MIDI) subprogram has been incorporated into the Residential portfolio from Local Government Partnerships. The subprogram still works closely with local governments and is coordinated with RHA's Energy Fitness third-party subprogram.

To simplify multifamily access to PG&E's energy resources, PG&E has established an independent Multifamily Single Point of Contact (SPOC). The SPOC will coordinate EE, income qualified, and other energy resources (Demand Response, Distributed Generation, Rate Options, and Electric Vehicles) for multifamily building owners.

Lastly, PG&E has increased the limit for multifamily building owners for On-Bill Financing (OBF) to \$2 million as a result of recent market findings. One recent study⁶ found that the significant combined influence of financing and incentive rebates drove 62 percent of participants to complete Home Upgrade Projects where they otherwise would not, and allowed 57 percent of participants to do larger projects. Additionally, a recent market potential study⁷ found that subsidized financing offers enabled greater access to EE in the multifamily sector.

Energy Upgrade California™

Energy Upgrade California™ aims to capture large savings potential and help customers achieve deep energy reductions. PG&E has increased focus on the Energy Upgrade California™ - Advanced Home Upgrade (Advanced Home Upgrade pathway), which works with contractors on comprehensive whole home retrofits. The Advanced Home Upgrade pathway (AHUP) is the highest performing segment of the Energy Upgrade California subprogram. PG&E's investment in AHUP, specifically advanced contractor training, is enabling the sunset of the underperforming Home Upgrade pathway with minimal impacts to the participating contractor network.

Market Transformation - Retail Products Platform

Working closely with ENERGY STAR® staff and eight program administrators nationwide, PG&E's Residential Program team led a national expansion of the Retail Products Platform (RPP) pilot in 2017. RPP seeks to enable program administrators to capture plug load energy savings by motivating retailers to promote, assort, stock, and demand more energy-efficient models; manufacturers to produce more efficient products; and the ENERGY STAR® program to increase the efficiency requirements in targeted product categories.

RPP is a strategic market transformation effort designed to create long-lasting, sustainable changes in the functioning of product-specific markets by reducing market barriers to the adoption of EE plug-load and appliances. RPP focuses on addressing the growing number of small plug-loads on the market through a midstream incentive to retailers.

Residential Subprograms

Residential Energy Advisor Subprogram

The Residential Energy Advisor subprogram uses behavioral outreach initiatives and interactive tools, including the Home Energy Report (HER) and Home Energy Checkup (HEC), to engage customers and encourage participation in innovative energy initiatives. The suite of products

⁶ Regional Finance Program Attribution and Cost-effectiveness Study (<https://pda.energydataweb.com/#/documents/1983/view>).

⁷ PG&E Multifamily Finance Opportunity Study (<https://pda.energydataweb.com/#/documents/2030/view>).



and services enable customers to understand and manage their energy use, and where appropriate, be guided to whole-house energy solutions. The HER is sent to over two million customers on an ongoing basis to show how their energy usage changes over time and how their usage compares with similar homes in their area. The HEC is a self-guided online assessment that helps customers understand where they use energy in their homes, provides energy-saving tips and suggestions based on their specific situations, and generates a simple checklist plan saved on a customer's PG&E Your Account website to track their progress as they complete the items on their plan.

2017 Strategies and Successes

PG&E focused on the enhancement and expansion of the HER product, a personalized mailer aimed to create positive energy change to a broad consumer base by showing the consumer their home's energy use and how they compare to similar homes in their area. Based on learnings from the first waves of reports, PG&E launched additional waves to reach over 300,000 new customers. Currently, 1.5 million active customers receive HER. PG&E also expanded email HERs to 650,000 existing HER recipients to complement the mailer and drive deeper engagement in the online channel.

In 2017, the PG&E Marketing team implemented an automated marketing journey to encourage customers who have started the Home Energy Checkup to complete the assessment and to engage with other energy management tools. With this new tactic and the use of integrated marketing campaigns, approximately 162,000 customers completed the Home Energy Checkup in 2017 compared with 90,000 in 2016.

PG&E's Marketplace is another tool that helps customers choose more efficient products during the research phase of their journey by presenting an Energy Score and other energy related features, such as "Clear Cost" or total cost and lifetime energy costs. In 2017, over 250,000 customers visited the Marketplace to research home appliance and consumer electronics. In April, Marketplace 2.0 was launched to include new features such as price drop notifications, the ability to "favorite" products, and an overall better user experience. Additional categories to support AB 793 were added to include Connected Home products, smart thermostats, and Connected Applications which are applications that leverage Share My Data.

PG&E also concluded an Emerging Technology Study of the Marketplace to determine the influence of the Marketplace experience on a customer's purchase decision and impact to other PG&E programs. The study confirmed that the Marketplace provides information not readily available on retailer.com sites that helps customers make more efficient purchases, and also positively contributes to both the Plug Load and Appliances (PLA) and RPP programs.

Plug Load and Appliances Subprogram

The Plug Load and Appliances (PLA) subprogram aims to transform the market to achieve sustainable adoption of energy-efficient PLA products where ongoing intervention would no longer be required. For the short- to mid-term timeframe where EE PLA products are still not the market's default choices, the subprogram uses incentive mechanisms and strategic industry collaboration to increase availability, awareness, and adoption of energy-efficient products. For the longer-term timeframe, the PLA subprogram leverages Integrated Demand-Side Management (IDSM) programs to influence the development of codes and standards to ensure the minimum required EE levels, promote EE as the preferred choice in life-style, and promote new product purchases. The subprogram's long-term strategy seeks to create on-going demand



for energy-efficient products and thus motivate the industry to produce and sell highly energy-efficient PLA products as the market standard offering.

The PLA subprogram offers rebates and incentives to customers for purchasing and installing high-efficiency appliances, and works with other partners to drive the adoption of high-efficiency products as well as water saving measures. In 2017, the subprogram added smart thermostats in conjunction with PG&E's AB 793 implementation plan.

Additionally, PG&E worked with ENERGY STAR® staff and other utilities to lead the national advancement of RPP, a component of PG&E's PLA subprogram. RPP is a strategic effort to overcome barriers for residential customers to adopt energy-efficient products through a dedicated market transformation subprogram design. This design aims to produce sustainable changes in retail markets for plug-loads and appliances by reducing barriers to the manufacture, distribution, sale, and installation of energy-efficient products.

2017 Strategies and Successes

PG&E offered subprograms to residential end-use customers to cover some of the incremental costs of purchasing energy-efficient products. Eligible products included gas water heaters, electric heat pump water heaters, variable speed pool pumps and motors, and smart thermostats.

Marketing of the rebate programs was conducted on a multi-touch, multi-channel level including tactics such as email, digital advertising, and use of PG&E-owned assets such as PG&E's website, residential digital newsletter, and HERs. PG&E also successfully added refrigerators and clothes washers to the RPP Pilot in 2017 and continued to work with national program sponsors to broaden the scope and influence of the program with retailers, manufacturers, and the ENERGY STAR® specification setting team. In 2017, the national RPP initiative reached 18% of the U.S. consumer market with participation from major retail chains and buying groups for plug-loads and appliances.

The PLA subprogram was supported by a field services team who provided salesperson training, point of purchase materials, and in-field support to retail partners. PG&E received applications for the subprogram, which were received via mail, online, and at retail point-of-sale.

Energy Upgrade California™ Subprogram

The Energy Upgrade California™ subprogram provides incentives for comprehensive home upgrades to residential customers in single family (Home Upgrade pathway and Advanced Home Upgrade pathway (AHUP)). The subprogram guides and supports customers to complete comprehensive energy saving retrofits using the whole house approach. The subprogram particularly focuses on safety and customer satisfaction, as each potential participant receives industry leading combustion appliance safety testing. PG&E also ensures carbon monoxide monitors are installed to promote continued safety.

2017 Strategies and Successes

PG&E focused on the Advanced Home Upgrade in 2017 because of declining effectiveness of the Home Upgrade pathway. On average, homeowners that participated in the Advanced Home Upgrade are expected to see a 23 percent improvement in their household energy use.

PG&E's Home Upgrade subprogram has garnered much success throughout 2017, achieving a high satisfaction rate among participants. PG&E also continues to innovate through more robust



contractor channel building via collaborative approaches such as integration of Air Conditioning (AC) Quality Care and Home Upgrade and concierge mentoring.

Multifamily Home Upgrade Subprogram

PG&E's Multifamily Home Upgrade subprogram (MUP) promotes long term energy benefits for affordable and market-rate multifamily housing through comprehensive EE upgrades.

Historically, owners and managers of multifamily properties have been less responsive to EE efforts than other residential customers. The MUP uses a tiered performance-based approach which allows property owners to make informed decisions on cost-effective measures and maximize savings by conducting an energy audit, and offers incentives to offset the cost of the assessment and the improvements.

MUP completed 4,961 units in 2017, a steady increase from the 3,301 units completed in 2016. The subprogram achieved an average 20 percent improvement in building EE compared to existing conditions.

2017 Strategies and Successes

PG&E continues to strengthen MUP through focused training with approved Raters and Contractors, streamlining project assessment reviews, an emphasis on field quality control to engage with partners throughout the process, and showing owners that MUP verifies the quality and completeness of the work. Quarterly partner calls were instituted to provide a communication channel to update partners about subprogram developments, rule changes, and provide continuous feedback to ensure the information they share with customers is the most current.

In 2017, PG&E transitioned subprogram delivery channels to integrate available multifamily services through a single customer service pathway referred to as the Multifamily SPOC. The SPOC approach removes the customer burden of navigating available subprograms, determining eligibility, and applying to various subprogram opportunities. SPOC provides tailored guidance for each multifamily customer. Rather than prescribing a subprogram to a customer base, PG&E helps each customer assess needs individually to identify the best solution, or solutions, for each community or property. Through a menu that includes various complementary offerings, EE to water savings, and renewables, and previously out-of-reach assistance like benchmarking and financing, SPOC helps multifamily customers maximize project scope and energy savings by locating individualized solutions to their specific needs.

The SPOC provides a gateway to nine of PG&E's intervention strategies and countless local, regional, and state subprograms. The PG&E-administered services include:

- EE program offerings
- Low-income and middle-income specific offerings
- Financing options
- Federal and state tax credits and programs
- Demand response and distributed generation programs
- Electric vehicle infrastructure support
- Whole property upgrade rebates
- Water efficiency



- Benchmarking

All multifamily customers, regardless of property type (e.g., affordable or market-rate), planned scope, resident income level, and other factors, will receive subprogram recommendations unique to their property. Through SPOC, PG&E aims to provide streamlined, personalized, and comprehensive support for multifamily customers to yield savings for low- and middle-income customers, safe indoor air quality, easier to operate buildings, more comfortable homes, and expanded retrofits of multifamily buildings throughout PG&E territory.

To identify service gaps, continuously improve subprogram opportunities for multifamily customers, and improve service delivery, PG&E will enable a feedback mechanism that solicits input from both customers and SPOC staff. Multifamily customers can engage SPOC online, by email, or by phone to identify rebates, financing, measures, and services available throughout PG&E territory.

Additionally in 2017, PG&E expanded availability to the On-Bill Financing (OBF) subprogram for multifamily buildings to \$2 million per premise as ordered in the low-income proceeding.⁸ The OBF subprogram is available to non-residential meters (common areas and some master meters) in multifamily buildings.

Residential New Construction Subprogram

The Residential New Construction subprogram consists of the California Advanced Homes Program (CAHP) for single family homes, and PG&E's California New Homes Multifamily third-party subprogram. The CAHP and California New Homes Multifamily subprograms highlight best practices in EE, green building, and sustainability, and offer financial incentives to help builders and architects create environmentally friendly, energy-efficient communities for potential home buyers. Both subprograms work to encourage building and related industries to exceed California's Title 24 EE standards through a combination of education, design assistance, and financial support, and to prepare builders to achieve Zero Net Energy (ZNE) by 2020.

2017 Strategies and Successes

The Residential New Construction subprograms updated their subprogram structures and designs to better guide participants towards the 2019 Title 24 updates. With that in mind, the program has moved to using the improvement in energy design rating (EDR) to determine eligibility and base incentive level. The EDR is a whole-building metric that accounts for all end uses in the home, including plug-loads, and will be the metric used, in lieu of percent above code, for compliance in the 2019 code cycle. The subprogram has also placed an emphasis on advanced envelope measures by offering cash bonuses for specific measures. These high-performance envelopes insure the resiliency of the home energy savings for the life of the building.

This update has been easily understood and adopted by builders and their consultants. Furthermore, a strategy to leverage the relationship between Title 24 consulting firms and their builder clients proved successful. CAHP ensured Title 24 consultants possessed the requisite tools and knowledge to directly explain subprogram benefits to builders and thereby recruit projects on the subprogram's behalf. Directly engaging professional consulting firms was also beneficial in streamlining process efforts.

⁸ D. 16-11-022, p. 204-205



Overall, CAHP continued to move the market towards efficient home construction and the capacity to achieve future Title 24 updates, while also beginning to prove the potential for ZNE new construction two code cycles prior to the state's goal.

Residential HVAC Subprogram

PG&E's Residential HVAC subprogram is focused on driving EE and peak load reduction from our customers' use of heating and air conditioning. The subprogram promotes increased quality levels in the HVAC market for technology, equipment, installation, and maintenance. In addition to working with HVAC contractors on improving HVAC maintenance and installation practices through the AC Quality Care offering, the subprogram also included small-scale pilots of both an HVAC distributor incentive subprogram to upsell more high-efficiency units and an incentive subprogram to improve HVAC code and permit compliance. The Distributor Incentive Pilot includes continuous engagement with the participating distributors to facilitate and incentivize stocking and upscaling higher EE HVAC equipment.

2017 Strategies and Successes

Residential HVAC Quality Maintenance efforts are increasingly popular among contractors and home owners, resulting in the treatment of over 18,000 HVAC systems—more than triple the 2017 goal (4,750 HVAC systems). To enhance the quality of service offered through the subprogram, PG&E offers best-in-class technical training to the participating contractors and technicians. In 2017, over 75 technicians were provided training under this initiative. PG&E also implemented multiple subprogram enhancements contributing to higher participation rates, improved cost effectiveness, and greater customer satisfaction. This includes introduction of smart data collection procedures, further strengthening of quality control, optimizing incentive levels, removing kickers, and ensuring the subprogram could serve a greater number of customers.

Commercial Program

PG&E's Commercial EE program offers commercial customers a consistent suite of products and services to help overcome the market barriers to optimized energy management. The program targets integrated energy management solutions – including EE, demand response, and distributed generation – through strategic energy planning support; technical support services such as facility audits and calculation or design assistance; and financial support through rebates, incentives, and financing options.

PG&E's Commercial EE program also targets the following customer segments: healthcare, hospitality, large office, high tech, retail, schools (both K–12 and higher education), and municipalities. PG&E also offers local program elements such as third-party and government partnership programs that complement and enhance these core offerings.

PG&E's vision (as stated in the Energy Efficiency Business Plan filed in 2017) in the Commercial sector centers on empowering large and Small and Medium-sized Business (SMB) customers to better understand, manage, and eliminate unnecessary energy use. PG&E is gearing up for the future of EE that includes a greater involvement in third-party-designed subprograms. The Commercial EE portfolio will be redefined to meet the needs of the EE marketplace, and PG&E is looking forward to helping California achieve future energy savings and climate goals.



The Commercial Program allows customers to install equipment and systems that are more efficient than they would install without the program. In addition, customer confidence in the persistence of their savings is increased by the program's commitment to installing high-quality, reliable, cost-effective measures.

Key Initiatives

Commercial Whole Building

2017 was the final year of the Commercial Whole Building (CWB) Demonstration which launched in 2013 as a proof of concept pay-for-performance initiative targeting deep energy savings in existing commercial buildings. 2017 was CWB's fourth year in this stage and PG&E focused on documenting lessons learned from the offering to serve as information to the marketplace. Two different studies are currently underway examining CWB processes around data, documentation, models, EM&V, and savings. This demonstration project has been key in identifying lessons learned and best practices for future NMEC projects.

Targeted Demand Side Management (TDSM) Initiative

PG&E's Commercial EE team supported the TDSM initiative through data analytics and program support to the upcoming Oakland Clean Energy Initiative (OCEI). Although OCEI will primarily be a 2018 activity, in 2017, the Commercial EE team provided program knowledge and market support to prepare for this targeted subprogram.



2017 Strategies and Successes

PG&E focused on several key strategies in 2017 to position its subprograms to achieve PG&E's vision for the Commercial sector: putting commercial buildings on a path to ZNE by 2030 for all new buildings and half of existing buildings.⁹

Specifically, PG&E leveraged its breadth of offerings to meet the needs of its diverse commercial customer base. PG&E strived to meet customers in their energy journey through its statewide subprograms dedicated to new construction, retrofit/retro-commissioning and behavioral services. PG&E continues to align subprogram offerings in the customized and Savings By Design (SBD) subprograms in order to streamline its offerings to the marketplace.

Deep engagement with contractors, trade professionals, building engineers, design teams, energy service companies (ESCOs), manufacturers, retailers, and distributors allowed PG&E to deliver a wide variety of intervention strategies to provide customers with a solution and touchpoint that is right for them. This approach also helped identify and prioritize ways to reduce energy use and increase EE, and provided tools and opportunities to increase the affordability of EE projects in both new and existing facilities.

PG&E also focused on documentation and communication of custom subprogram policies in 2017. PG&E continued to provide updates to the Custom Rulebook to keep the Rulebook relevant and useful to the EE community.

Opportunities Moving Forward

PG&E will employ several new strategies over the next year to advance the state's ambitious policy goals and place PG&E's customers on the path to deep and persistent energy savings. This includes an emphasis on data analytics for enhanced customer targeting, technical assistance and tools, new financial solutions, and developing new subprogram models for metered-based savings.

PG&E is working collaboratively with the statewide Savings By Design (SBD) team and Commission staff to better align the subprogram on the path to ZNE. Additional subprogram enhancements include technical assistance offerings to ensure savings persistence in commercial new construction buildings. PG&E is also working to provide a more integrated offering with our Workforce Education and Training (WE&T) team to train and transform the ZNE market.

In 2017, PG&E launched the re-envisioned Commercial HVAC Optimization subprogram, which facilitates multiple paths for customer participation. The subprogram design includes tiers, a one-year and three-year maintenance

Serving Our Customers:

Through its Third-party Program channel, PG&E offers commercial customers a suite of targeted, niche program offerings designed specifically to meet them on their energy journey.

In 2017, third-party programs targeted small and medium businesses, hospitality, hospitals, grocery stores, and focused on a variety of technologies including HVAC and advanced LEDs. Additional details may be found in the Third-party Programs section of this report.

⁹ California Long Term Energy Efficiency Strategic Plan, 2011 Update:
http://www.energy.ca.gov/ab758/documents/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf



agreement for participation based on customers' needs, and more closely aligns with the statewide subprogram design.

Statewide subprogram design and implementation offers many benefits, including making it more efficient, comprehensible, cost effective, and attractive for multi-site customers, third parties, contractors, distributors, retailers, lenders, state and federal agencies, and other stakeholders to participate. For these reasons, PG&E will prioritize coordination on statewide subprogram design and implementation, while continuing to attend to the local and regional needs of our diverse customer bases.

Statewide Commercial Subprograms

Calculated Subprogram

The Calculated subprogram provides financial incentives for non-residential customers to install new equipment or systems that exceed applicable code and/or industry standards in existing buildings. PG&E's Calculated subprogram includes both customized incentives (formerly "Customized Retrofit") and Retro-commissioning (RCx) offerings. RCx represents an important element of PG&E's EE toolkit by reducing energy usage and optimizing the efficiency of mechanical equipment, lighting, and control systems to current standards in existing facilities. To these ends, PG&E offers financial and technical assistance for customers to undertake RCx projects and implement measures that improve facility operations.

Customized New Construction (CNC) has been a subset of the Calculated offering since 2015. CNC serves the Commercial new construction segment for projects requiring more customized calculations, such as spaces with an industry standard practice (ISP) baseline rather than Title 24 (e.g., biotech buildings).

2017 Strategies and Successes

The customized incentives and RCx offerings paid incentives for 111 projects. PG&E has been working to improve its delivery of custom subprograms, leveraging lessons learned and best practices from ex ante review guidance. In particular, PG&E developed specific trainings for its engineering teams, program managers, and third-party vendors. These trainings help align the team on policy, baselines, measures, reports, calculation tools, and methods. In addition, PG&E established more rigorous quality control amongst its technical reviewers, focused specifically on reporting quality and subprogram compliance.

Savings by Design (SBD) Subprogram

The SBD subprogram serves the Commercial new construction segment by promoting integrated design through owner incentives, design team incentives, and design assistance to participants. The purpose of the subprogram is to influence and encourage customers to design and build commercial buildings above and beyond what is required by California's Title 24 standards. The minimum requirement to participate in the subprogram is 10 percent greater than Title 24 standards.

2017 Strategies and Successes

PG&E paid for 49 projects in the SBD subprogram. The SBD subprogram identified and implemented changes to policies, procedures, and tools to improve the cost effectiveness of the program. The whole building path continued to be a focus for the SBD subprogram. In 2017, the

PG&E SBD team collaborated with the other IOUs to prepare the subprogram for a statewide third-party solicitation. PG&E recognizes the current pipeline of SBD projects and is focusing on serving those customer commitments as well as preparing the commercial new construction market for new subprogram design. The SBD subprogram will continue to work with ZNE and codes and standards stakeholders to align efforts for future subprogram design strategies. The statewide SBD subprogram-sponsored AIA (American Institute of Architects) design conference increased subprogram awareness with the anticipation of increased project participation for the upcoming subprogram year.

Commercial Deemed Incentives Subprogram

The Commercial Deemed Incentives (Deemed) subprogram offers prescriptive rebates directly to customers, vendors, or distributors for the installation or sale of energy-efficient equipment. The subprogram offers a broad array of measures across technology segments including lighting, HVAC, food service, refrigeration, and water heating. The Qualified Products List (QPL) has been a successful tool for the marketplace to implement the deemed subprogram.

2017 Strategies and Successes

PG&E strengthened delivery of the Deemed subprogram in 2017 by bolstering activity in its three primary delivery channels: 1) PG&E account representatives discussing rebate offers with customers; 2) trade professionals integrating PG&E rebates into their business models; and 3) distributors stocking and selling efficient equipment at reduced cost as well as providing point-of-sale instant rebates to customers purchasing qualifying products.

The subprogram continues to successfully encourage customers to adopt advanced lighting efficiency technology, demonstrated by light emitting diode (LED) lighting savings comprising most of the subprogram savings.

PG&E's non-lighting Deemed Commercial subprogram offerings out-performed expectations. PG&E drove therm savings through increased rebates for food service equipment (specifically fryers) and the water heater and boiler midstream subprogram. These measures – combined with previously increased rebates for ovens, holding cabinets, demand control kitchen ventilation (hood retrofits), and griddles – continue to drive the food service segment toward overcoming high capital costs to invest in new, more efficient equipment.

The Deemed Commercial subprogram maintained its applicability to all commercial customer segments including small, medium, and large commercial customers. A new lighting offering for new construction projects, incorporated in 2016, was a main focus for the subprogram in 2017. The Deemed Commercial subprogram continues to be an efficient, accessible subprogram offering both downstream and midstream delivery channels to maximize energy savings through various entry points in the marketplace.

Commercial Direct Install Subprograms

PG&E's Commercial Direct Install (DI) offerings are administered through its Government and Community Partnership program. These DI subprograms provide small and medium business customers with the opportunity to have a third-party contractor retrofit existing systems with energy-efficient equipment at low or no cost to the customer. Because many small and medium business customers have short-term leases and a split-incentive barrier (in which the customer does not own the equipment that they pay bills for), these subprograms are an effective way to address the needs of this sector and overcome the barriers of limited capital, expertise, and understanding of EE benefits. For more information about PG&E's successes in Direct Install, please see the Government and Community Partnership program section.



PG&E Acts as a Leading Voice in Evolving and Implementing Transformative HVAC Programs

As Program Administrators and active members of the Council of Advisors and the Executive Committee (EC) of the Western HVAC Performance Alliance (WHPA), PG&E's Residential and Commercial EE experts are collaborating with a broad group of HVAC industry stakeholders, EE professionals, facility and property management organizations, researchers, educators, utilities, and regulatory agencies to champion HVAC policies to curb energy waste throughout California and the Western region. The WHPA is currently working on updates to the CA EE Strategic Plan to ensure more comprehensive integration of IDSM strategies and Existing Building Energy Efficiency Action Plan objectives.

Commercial Energy Advisor Subprogram

The Commercial Energy Advisor subprogram offers a suite of products and services to support customer education and participation in EE, DR, and self-generation opportunities, as well as to promote awareness of GHG and water conservation activities. The subprogram utilizes proactive outreach initiatives and data-driven interactive tools designed to engage and motivate customers to reduce their energy consumption through personalized subprogram recommendations.

2017 Strategies and Successes

The subprogram continued to leverage new technology platforms in 2017 to facilitate providing IDSM education, greatly increasing PG&E's ability to scale on-site integrated audit services for customers. Examples include the Commercial Universal Audit Tool designed to be more engaging, easier to complete, and with more industry- and customer-specific content, and on-site energy audit tools in Energy Insight as part of

continued enhancements to the Energy Insight platform.

PG&E maintained a focus on building benchmarking assistance and facilitated trainings and automated data exchange to help customers better understand their energy usage. To support the identification and prioritization of EE opportunities, PG&E offered on-site, remote, and self-service energy audits, including integrated audits that combine EE recommendations with demand response and distributed generation information.

Commercial HVAC Subprogram

The Commercial HVAC subprogram delivers a comprehensive set of midstream and upstream strategies that builds on existing subprogram, education, and marketing efforts, and leverages relationships within the HVAC industry to foster a sustainable, quality-driven market. As noted in the call out box, PG&E participates in the WHPA, a leading organization setting standards and determining marketplace penetration for HVAC in California.

2017 Strategies and Successes

The Commercial HVAC subprogram is comprised of three elements that enable market transformation, direct energy savings, and demand reductions: Upstream HVAC Equipment Incentives, Commercial Quality Installation, and midstream Commercial Quality Maintenance (C-QM). The Upstream HVAC subprogram has received positive feedback as one of the most successfully launched EE subprograms over the last 10 years.

Upstream HVAC Equipment Incentives

This subprogram element offers incentives to distributors who sell qualifying high-efficiency commercial HVAC equipment to increase the stocking and promotion of this equipment.



2017 Strategies and Successes

In 2017, PG&E promoted the Commercial HVAC subprogram to distributors that currently participate and those who have limited or no participation. Furthermore, PG&E evaluated new technologies and associated equipment categories for the subprogram, such as those with higher tiers for packaged equipment to achieve greater savings and move the market toward higher efficiency units, and engaged in statewide collaboration to share best practices across IOUs for subprogram design and training. For the future, new technologies (e.g., VRF) and HVAC building controls are also being assessed for inclusion into this subprogram.

Commercial Quality Installation

The Commercial Quality Installation offering addresses commercial installation practices to ensure HVAC equipment is installed and commissioned in accordance with industry standards.

2017 Strategies and Successes

Commercial HVAC Quality Installation Contractor Education and Customer Awareness subprograms were delivered based on Air-Conditioning Contractors of America (ACCA) standards. The CPUC, IOUs, and industry stakeholders in the WHPA collaborated to validate the market transformation groundwork being laid and ensure HVAC performance standards can be verified in a sustainable manner.

Commercial Quality Maintenance

Commercial Quality Maintenance focuses on commercial maintenance practices to ensure equipment is serviced in accordance with industry standards. It seeks to transform Commercial HVAC maintenance from a commodity-based industry to a quality-based industry. This subprogram has had a significant effect on existing systems EE performance on an ongoing basis, as described in further detail below.

2017 Strategies and Successes

In 2017, 2,755 new units were introduced into the Commercial Quality Maintenance program. This HVAC program provided incentives for system assessment, system optimization, and continued rooftop unit maintenance based on American National Standards Institute (ANSI), American Society of Heating, Refrigerating, Air Conditioning Engineers (ASHRAE), and ACCA Standard 180. PG&E conducted 22 training sessions for commercial contractors on advanced diagnostics and other quality maintenance practices to ensure participating contractors and technicians have the skills necessary to assess, maintain, and optimize systems per industry standards. Seventy-four new technicians were certified on the subprogram specific requirements.

Through this subprogram, PG&E also supported commercial contractors with marketing materials and outreach efforts to educate customers on the value of quality maintenance and using licenses and certified technicians. PG&E participated in monthly WHPA subcommittee meetings, discussing input and feedback regarding improvement to the C-QM initiative. Simplified the data gathering process for contractors on the rooftop by providing options to use the Information Technology (IT) interface, as well as paper questionnaires. Finally, PG&E implemented contractor re-training to ensure subprogram quality maintenance standards are met.

Industrial Program

California's industrial sector is extremely diverse. In most cases industrial facilities are heavy energy users. Throughout 2017, PG&E focused on EE solutions for its industrial sector customer base to help reduce energy consumption and GHG emissions, and increase customers' profitability by lowering energy costs. The 2017 statewide Industrial EE program partnered with industry stakeholders to promote a comprehensive list of energy management solutions to end-use customers. This suite of program services not only overcomes the traditional market barriers to EE, but also uses efficiency to advance IDSM opportunities such as demand response and distributed generation. Key offerings included rebates and incentives for efficient equipment and systems, technical support such as facility audits and energy savings analysis, zero interest project financing, and strategic energy planning.

The Industrial subprograms targeted and successfully completed projects in various facilities including oil production, printing plants, plastic injection molding, component fabrication, lumber and paper mills, cement and quarries, metals processing, petroleum refineries, chemical industries, assembly plants, and water and wastewater treatment plants.

PG&E marketed and delivered these offerings through several channels, including direct communication with facility personnel, presence at industry events, support for education and research activities, and close partnerships with engineering and installation firms. PG&E's portfolio of offerings also includes specialized third-party subprograms focused on specific technologies, segments, or approaches with specialized requirements. These third-party subprograms bring deep knowledge of industrial processes and are described in more detail in the Third-Party Programs section.

2017 Strategies and Successes

Industrial customers are sophisticated in their understanding of energy usage within their facilities. While these customers understand and appreciate EE, decisions to upgrade to energy-efficient equipment must be balanced with minimizing operational and production risks.

PG&E works closely with customers to understand their business needs so that subprograms are carefully designed and offerings align with customers' requirements while minimizing risk. PG&E depends on a team of EE experts including account representatives, project engineers, contractors, and third-party implementers with deep technical knowledge and understanding of industrial processes to offer industrial customers the right EE solution at the right time—from EE audits and scoping EE projects via its Energy Advisor Program, to financial offerings to install

Serving Our Industrial Customers:

PG&E's industrial customers benefit from segment specific program offerings delivered through its third-party program channel.

PG&E leverages its Industrial third-party subprograms to provide technical expertise relevant to the customer segment, test new and innovative measures, program strategies and design, and provide turn-key/concierge services which help to meet customer needs. In 2017, third-party programs specifically targeting oil fields, refineries, heavy industry, light industry, water/wastewater plants and food processors completed over 167 efficiency projects.





EE projects through its calculated and deemed customer incentive subprograms or its OBF subprogram.

Engagement strategies depend on the size and type of industrial customers. PG&E's dedicated account representatives serve as trusted energy advisors and work closely with customers to offer solutions based on the customer's energy cost savings requirements, budget availability, and timing.

In 2017, PG&E supported and processed 172 projects through the Industrial statewide program. Most of the gas savings is attributed to oil production, while electric savings are mostly credited to improved process modification and controls, and pump and fan retrofits. The various cost savings and the non-energy benefits associated with reduced maintenance of higher efficiency equipment was a successful method of championing EE projects within all industrial sectors.

In addition to working with customers to support their analysis and project development needs, PG&E also invested time and resources in guiding and training project developers on best practices in selecting and qualifying appropriate industrial projects for custom incentives. PG&E's project development protocol was an important tool to help establish the necessary documentation understand the customer's standard practices, measure eligibility, and general decision-making framework. The training and coaching provided by PG&E's in-house engineers was pivotal to helping the market adapt to new policies.

Implementation Challenges

The industrial sector has several common implementation challenges. New technologies are slow to evolve, and are cautiously adopted. Since many industrial customers operate their facilities 24/7, minimizing disruption in their production processes is of paramount importance. The capital costs associated with many EE projects represent significant challenges to industrial customers. Program participation has become more complex and time consuming. In PG&E's territory, for example, the oil sector and municipal water/wastewater sector represent a large portion of energy savings opportunities but are the most affected by these challenges.

Throughout 2017, the rate of new oil sector EE projects has continued to decrease as many measures are now considered Industry Standard Practice (ISP). In addition, the reduction of crude oil price per barrel has slowed production and limited the type of projects in which oil producers are willing to invest.

Municipal water/wastewater facilities are ripe with EE opportunities, but are also challenged to ensure EE implementation has minimal or zero disruption to the services they provide and several measures becoming standard practice. Historically, equipment upgrades that are not included in the capital budgeting process have had difficulty securing financing.

PG&E is well prepared to handle these challenges by continuously looking for ways to offer new technologies and financing opportunities, and improved education and training initiatives. For example, PG&E account representatives are educating municipalities on leveraging financial subprograms such as PG&E's OBF subprogram to overcome the capital cost hurdle.

Opportunities Moving Forward

PG&E is focused on three key opportunities to support an evolving marketplace:

- Engage with national and statewide stakeholders to develop new prescriptive measures and technical specifications that benefit industrial process and equipment efficiency. PG&E has

developed new Industrial Pumping System Upgrade Guidelines that provide an integrated approach to pumping system efficiency.

- Evolve program offerings to enable strategic energy planning and rebuilding eligible retro-commissioning opportunities. For example, PG&E completed a comprehensive bidding process in 2017 and launched the Industrial Strategic Energy Management subprogram in early 2018.
- Focused training on proper project development guidelines to improve compliance with policies and procedures. PG&E recognizes that some challenges continue to persist around compliance with program and policy rules. In 2017, PG&E instituted instructor-led training and real-time project support to better prepare our various project development partners in ensuring compliance with policies.

Statewide Industrial Subprograms

Industrial Calculated Incentives Subprogram

The Industrial Calculated Incentives subprogram provides customized incentives for non-residential EE retrofit and new construction projects involving the installation of high-efficiency equipment or systems. Incentives are paid on the energy savings and permanent peak demand reduction above and beyond baseline energy performance, which include state and federal-mandated codes, ISP, or other baseline energy performance standards. Focus areas for the 2017 subprogram included process and non-process loads at various industrial facilities that reduced energy usage associated with process modification and controls, boiler and steam systems, high bay and outdoor lighting measures, and pumps and fans.

2017 Strategies and Successes

As part of its Industrial Calculated Incentives subprogram, PG&E focused on direct engagement of customers by pursuing two primary strategies. First, by leveraging its team of experienced, local, and dedicated account representatives and field engineers via local workshops, trade shows and industry events. Second, continuing to develop and enhance its partnerships with industry associations and equipment vendors. Finally, PG&E continued to make improvements in project quality and consistency in policy interpretation, including application of consistent baselines, measure costs, and ISP determinations across projects. These process improvement initiatives stemmed from lessons learned and best practices identified in the CPUC custom impact evaluation and the ex-ante review process.

Deemed Incentives Subprogram

The Industrial Deemed Incentives subprogram provides rebates for the installation of new EE equipment and measures. Deemed retrofit measures have fixed incentive amounts per unit/measure and are intended for projects that have well-defined energy and demand savings. In many cases, projects are identified through utility EE audits, customer communications with PG&E account representatives, or partnerships with equipment vendors and trade allies.

2017 Strategies and Successes

As the price of LED lighting continues to go down, 2017 saw continued growth in adoption of high bay lighting in industrial and warehouse spaces.



Industrial Continuous Energy Improvement Subprogram

The Industrial Continuous Energy Improvement (CEI) subprogram is a consultative service which targets long-term and strategic energy planning. CEI is designed to reintroduce the importance of energy management through a comprehensive energy management approach involving identification and tracking of energy productivity metrics, identifying stakeholders for the company's energy and associated financial impacts, planning for capital projects, and sharing of best practices within the organization and amongst cohorts of peers.

2017 Strategies and Successes

Following up on the success of the cohort model implementation in 2016, PG&E developed a case study sheet to educate customers and account representatives of the benefits and results of a cohort engagement. This resource will be important as the new Strategic Energy Management subprograms launch in 2018.

Looking ahead, PG&E will transition a majority of its CEI activities to the Industrial Strategic Energy Management subprogram per D. 16-08-019.¹⁰ PG&E sees a benefit in utilizing the CEI subprogram to assess the feasibility of alternative SEM formats that would be conducive for small to medium industrial customers.

Industrial Energy Advisor Subprogram

The Industrial Energy Advisor subprogram provides customer education and encourages participation in EE, demand response, self-generation subprograms and promotes awareness of GHG and water conservation activities. The subprogram works to assist customers in the implementation of the appropriate solutions for their business while placing an emphasis on deep energy savings opportunities and continuous improvement over time. Aligning integrated improvement opportunities with customers' needs, the Energy Advisor Program helps customers appreciate EE benefits therefore increasing subprogram participation and adoption rates.

2017 Strategies and Successes

PG&E continued to offer on-site and remote energy audits, including integrated audits that combine EE recommendations with demand response and distributed generation information. In addition, PG&E focused attention on close coordination with large end-use customers to understand project scope and timeframe constraints to better influence customer selection of state-of-the-art EE and demand management solutions.

¹⁰ D. 16-08-019, pp. 41-42



Agricultural Program

In 2017, the Statewide Agricultural EE program provided a portfolio of offerings to support an industry heavily impacted by five years of statewide drought conditions. The Agricultural program, coupled with demand response and distributed generation programs, helped agricultural producers and processors manage energy costs and make informed investments in new equipment. Through four agricultural-focused subprograms, the statewide team offered a full suite of tools to position California agricultural customers to eliminate unnecessary energy use. Key offerings included rebates and incentives for efficient equipment and systems, technical support such as facility audits and energy savings analysis, zero interest project financing, and pump efficiency education.

Programs in 2017 targeted the agricultural growers (field crops, fruits and nut trees, vegetables and vineyards), post-harvest processors, dairies, irrigation districts/agencies, fruit and vegetable processors (canners, dryers and freezers), agricultural service providers, wineries, and other beverage manufacturers.

PG&E marketed and delivered these offerings through a number of channels, including direct communication with customers, advertising in industry publications, presence at industry events, support for education and research activities, and close partnerships with engineering and installation firms. PG&E complements its statewide EE offerings with concierge EE solutions through its third-party programs focused on specific technologies, segments, or approaches with specialized requirements. These programs are described in more detail in the Third-Party Programs section.

2017 Strategies and Successes

Local presence in agricultural communities. PG&E focused on building trust with customers in their own communities by providing information about efficient irrigation equipment and operations via trusted trade professionals, scheduling workshops with partners such as local farm bureaus and the League of Food Processors, and collaborating with agricultural universities such as California State University, Fresno and California Polytechnic State University, San Luis Obispo (Cal Poly).

Water Energy Nexus. The agricultural industry is a central stakeholder in California's water-energy nexus, with a footprint of nearly 80 percent of California's developed water usage, 4% of annual energy use statewide, and \$47 billion of direct economic impact. Using existing and new subprograms, PG&E continues to prioritize approaches to jointly improve water and energy management for growers and manufacturers.

Evolving subprogram offerings. PG&E prioritized planning for the development of a new methodology for agricultural pump overhaul calculations. The methodology was developed and analyzed in 2017 through a partnership with Cal Poly. PG&E responded to new opportunities in the irrigation market by developing an enhanced irrigation variable frequency drives (VFD) specification in conjunction with Cal Poly with input from manufacturers and vendors. The new VFD measure will launch at the beginning of 2018.

In 2017, more than \$7.9 million of PG&E incentives supported investments for 1,486 applications, including 69 by third-party subprograms. These savings come from a wide range



of statewide coordinated and local and regional subprogram offerings and through PG&E's segment-specific third-party programs.

Implementation Challenges

For energy-intensive process equipment (including pumps and mechanized processing facilities), equipment decisions must be made in the context of minimizing risk of interruption to production output or quality. PG&E works closely with customers to understand their business needs so that subprograms are carefully designed, and offerings align with customers' requirements while minimizing risks. Due to above average rainfall that ended the drought, many customers received surface water allocations and did not need to use their well pumps as frequently as previous years.

Opportunities Moving Forward

The agricultural industry's energy usage has grown in recent years as surface water supplies have been cut, local water tables have dropped, and businesses have invested in new equipment and capacity to improve production capabilities. Pump and irrigation energy usage requires comprehensive management, technology, and operations approaches in order to achieve reductions. To further agricultural customers' EE opportunities, PG&E is continuing evaluations of new technology-enabled approaches to water and energy management, including sensing technologies, analysis tools, and process automation via partnerships with start-up companies, agricultural universities, and leading growers. Ultimately, these technologies may be a core component of PG&E's Agricultural subprogram strategy. In the near term, PG&E will continue to support investments in VFDs and other opportunities to improve the efficiency of irrigation systems. PG&E is also exploring ways to serve customers with process lighting for dairy and indoor agricultural operations.

Statewide Agricultural Subprograms

Agricultural Calculated Incentives Subprogram

The Agricultural Calculated Incentives subprogram offers incentives for a wide range of energy-efficient technologies including steam systems, refrigeration equipment, and lighting technologies. PG&E account representatives and engineering experts work closely with customers throughout the design and installation process to evaluate, and help customers implement, the most energy-efficient technologies. Customized projects were carefully tracked from audits through project completion, with PG&E EE experts involved at each step of the way.

2017 Strategies and Successes

The Statewide Agricultural Calculated Incentives subprogram provided incentives for 30 applications, with incentives ranging from less than \$1,000 to nearly \$167,000. Following the geographical concentration of California's agricultural industry, projects were concentrated in the Central Valley and Central Coast.

Agricultural Deemed Incentives Subprogram

The Agricultural Deemed Incentives subprogram provides fixed rebates for high volume measures, such as HVAC, lighting, and irrigation equipment. Projects are typically identified through utility EE audits, customer communications with local PG&E account representatives, or partnerships with equipment vendors and trade allies.



Program information was communicated to a customer base of over 35,000 growers through training events, mass media advertising, and the expertise of PG&E's dedicated agricultural local account representatives and call center representatives.

2017 Strategies and Successes

PG&E continued a rebate offering for VFD equipment for agricultural irrigation pumps, which helped farmers precisely control pumps in response to operational needs. The Deemed Program offers a better use of subprogram administration costs for this high-volume measure, while enabling a simpler customer experience.

The next generation VFD design was developed in 2017 and will be marketed in 2018.

Agricultural Energy Advisor Subprogram

In addition to a range of on-site and online energy audit offerings, the Agricultural Energy Advisor subprogram provides pump efficiency services, known as the Advanced Pumping Efficiency Program (APEP). This subprogram offers pump tests and incentives for pump efficiency improvements to agricultural, municipal, and irrigation district customers.

2017 Strategies and Successes

To assist businesses and governments, PG&E has allocated substantial funding for pump efficiency tests. These services were communicated through training events, mass media advertising, and PG&E's ongoing partnership with California State University, Fresno's Center for Irrigation Technology.

Based on feedback from the Commission staff's ex ante review team, and ex-post evaluation results, PG&E engaged California Polytechnic State University Irrigation Technology Resource Center to develop and test a new agricultural pump overhaul calculation methodology. This new methodology will account for future planned operations and environmental conditions in addition to historic usage and pump efficiency. By developing this new methodology, PG&E is laying the groundwork to develop calculation tools which will access deeper energy savings.

Agricultural Continuous Energy Improvement Subprogram

The Agricultural CEI subprogram is a consultative service which targets long-term and strategic energy planning. CEI is designed to reintroduce the importance of energy management through a comprehensive energy management approach involving identification and tracking of energy productivity metrics, identification of stakeholders for the company's energy and associated financial impacts, planning for capital projects, and sharing of best practices within the organization and amongst cohorts of peers.

2017 Strategies and Successes

Following up on the success of the cohort model implementation in 2016, PG&E developed a case study sheet to educate customers and account representatives of the benefits and results of a cohort engagement. This resource will be important as the new SEM subprogram launches in 2018.



Looking ahead, PG&E will transition a majority of its CEI activities to the SEM subprogram per D. 16-08-019.¹¹ PG&E sees a benefit in utilizing the CEI subprogram to assess the feasibility of alternative SEM formats that would be conducive for small to medium food processing and other agricultural production customers.

¹¹ D. 16-08-019, pp. 41-42

Lighting Program

The Statewide Lighting Program facilitates market transformation for advanced lighting products through a number of activities including: (1) assessment of pre-commercialized lighting technologies; (2) demonstration projects for advanced lighting technologies in the early stages of commercialization; and (3) incentives for cost-effective lighting measures that have reached a greater level of commercialization.

2017 Strategies and Successes

In 2017, PG&E focused support on markets for high-quality LED lamps and advanced lighting controls systems (ALCS).

California's Long-Term Energy Efficiency Strategic Plan's Lighting Action Plan (LAP) provides the backdrop for strategy development to overcome barriers and increase adoption of energy-efficient technologies, systems, and best practices to help reach California's 60-80 percent energy savings goal. The Lighting Market Transformation (LMT) Program is another element of the California IOUs' efforts to actualize the goals contained within the LAP. In 2017, PG&E continued progress on the ALCS Calculator Tool, implementing a coordinated in-field trial and evaluation with expected completion date of Q4 2018. The ALCS calculator tool is a key initiative as part of the Statewide Lighting Program's efforts to advance the adoption of ALCS while providing a reliable method to quantify savings associated with ALCS.

PG&E's Lighting Program Focuses on Opportunities to Best Transform Markets and Continuously Innovate

Using the latest input from the Lighting Market Transformation subprogram's Lighting Solutions Workbook, PG&E is developing roadmaps for future solutions appropriate for Lighting Innovation trials and Emerging Technologies projects.

Statewide Lighting Subprograms

Primary Lighting Subprogram

The Primary Lighting subprogram offers manufacturers of LED lamps rebates to reduce the cost of high-quality and energy-efficient lighting products. Since 2014, all incentives provided for LED measures in PG&E's Primary Lighting subprogram have been devoted to products that meet the CEC-spec. The last several iterations of the CEC-spec have aligned directly with future Title 20 code changes. This has enabled Primary Lighting to directly support advancements of California Codes and Standards.

2017 Strategies and Successes

PG&E's focus in the Primary Lighting subprogram has been to increase manufacturer participation. Every year since 2014, PG&E has substantially increased the number of manufacturer partnerships. In 2017, PG&E had 18 participating manufacturers, up from 15 in 2016. This approach ensures that the subprogram is best supporting code readiness in as broad a swath of the market as possible.

2017 marked the fourth full year of solely supporting LED lamps that met the new advanced LED specification as designed by the CEC. The subprogram saw a steady increase in eligible product availability from the prior year. The number of qualified LED lamp models was 557 at the end of 2017, a substantial increase from 2016.



Lighting Innovation Subprogram

The Lighting Innovation subprogram evaluates advanced lighting products or subprogram approaches new to the market, which have potential to eventually enter the Primary Lighting Residential upstream subprogram or the Commercial, Industrial, and Agricultural programs. Trials and studies are administered to determine recommendations, showcases, and field placement projects are conducted when applicable.

2017 Strategies and Successes

PG&E developed two key Trials in Lighting Innovation – the Lighting Designer Assistance (LDA) Trial and the Advanced Lighting Control System (ALCS) Calculator Trial. The LDA Trial was launched in November 2015 and the ALCS Calculator Trial which launched in Q2 2016. These trials contribute towards PG&E's approach to support Goal #2 of the LAP to "define and advance best practices for design, installation, operation and maintenance of integrated systems to achieve sustainable lighting solutions for all spaces." Each of the electric IOUs is targeting different aspects of ALCS. PG&E's contribution with the ALCS Calculator is intended to enable simplified savings estimation for various advanced lighting control strategies.

Lighting Market Transformation Subprogram

The Lighting Market Transformation (LMT) subprogram develops innovative data-driven subprogram strategies to adapt utility lighting subprograms to the ever-changing energy and lighting markets to support the Strategic Plan. The subprogram tracks, coordinates, and provides collaboration opportunities for utility, government, and industry LMT activities. The subprogram oversees the progression of lighting solutions across utility subprograms, such as ETP, Lighting Innovation, Primary Lighting, and C&S. These subprograms help ensure efficient progression of lighting solutions into and out of customer EE programs.

2017 Strategies and Successes

In 2017, PG&E played an active role in setting current and future direction of the lighting industry nationally by participating in several state and national committees in the lighting industry such as the Design Lights Consortium, Consortium for Energy Efficiency, and ENERGY STAR®.

Codes and Standards

The Statewide Codes and Standards (C&S) Program saves energy on behalf of ratepayers by influencing regulatory bodies such as the California Energy Commission and the U.S. Department of Energy (DOE) to strengthen EE regulations. The Program conducts efforts to increase compliance with existing C&S regulations to ensure that the State realizes the savings from new codes and standards, and supports local governments that include reach codes as a climate strategy. The Program also conducts planning and coordination with Investor Owned Utilities statewide to optimize collaboration, and code readiness activities to prepare for future codes. From a California perspective, 2017 C&S savings were as follows in Table 1.¹²

Table 1: California 2017 C&S Savings

	Gross Savings			Net Standard Savings			Net Program Savings		
	GWh	MW	MMTherm	GWh	MW	MMTherm	GWh	MW	MMTherm
Statewide	2,589	515	20.8	5,450	1,118	56.3	2,640	483	36.6
All IOUs	2,589	515	20.8	3,900	800	55.7	1,889	346	36.2
PG&E	2,589	515	20.8	1,721	353	20.5	834	153	13.3

Program advocacy and compliance improvement activities extend to virtually all buildings and appliances sold in California in support of the state's ambitious climate and energy goals. Support for state and federal building codes and appliances standards continues to move California towards residential new construction zero net energy (ZNE) buildings by 2020, non-residential new construction ZNE buildings by 2030, and the statewide goal set forth by Senate Bill 350 (SB 350) to reduce existing building energy usage by 50 percent.

Key Initiatives

Key initiatives of the C&S program include advocacy for new or updated sections of California's Building Energy Efficiency Standards and related ASHRAE and ICC activities;¹³ advocacy for new Title 20 and DOE appliance standards, and related ENERGY STAR® activities; training, tools, and resources to support compliance with existing codes and standards; development of new cost-effectiveness studies to support local government reach codes; long term planning and coordination activities to optimize work across California's utilities; and code readiness activities aimed at specific industries and technologies for future code cycles.

Building Codes Advocacy Subprogram

The Building Codes Advocacy subprogram primarily targets improvements to California's Building Energy Efficiency Standards (Title 24, Part 6). Title 24, Part 6 is updated by the Energy Commission on a triannual cycle. The subprogram also pursues changes to national building codes that impact California through ASHRAE and other national and international code-setting

¹² Gross Savings equal potential savings corrected for compliance rate. Net Standards Savings equal Gross Savings after correcting for normally occurring market adoption. Net Program Savings are calculated by applying an attribution factor to Net Standards savings.

¹³ ASHRAE is the American Society of Heating, Refrigerating and Air-Conditioning Engineers. ICC is the International Code Council.

bodies. Advocacy activities include, but are not limited to, development of code enhancement proposals and participation in public rulemaking processes. The subprogram may coordinate with or intervene in ratings organizations referenced in Title 24 (e.g., the National Fenestration Rating Council and the Cool Roof Rating Council) for both Part 6 and Part 11 (CALGreen).

2017 Strategies and Successes

The IOUs supported the Energy Commission's 2019 rulemaking by developing 40 building code proposals contained in 23 Codes and Standards Enhancement (CASE) reports (some reports contained multiple proposals). The 2019 CASE reports are available online.¹⁴

Expected savings from the following 2019 Title 24 CASE reports are approximately 671 GWh/year, 9.8 million therms and 35 million gallons of water for each year's construction following the expected effective date of January 1, 2020:

Residential

1. High Performance Walls
2. High Performance Attic (HPA)
3. Quality Insulation Installation (QII)
4. High Performance Windows
5. High Performance Doors
6. Residential Adoption of ASHRAE Standard 62.2-2016 Measures
7. Residential Quality HVAC Measures
8. Compact Hot Water Distribution
9. Drain Water Heat Recovery
10. Demand Response Cleanup

Nonresidential

11. Indoor Lighting Power Densities
12. Nonresidential Indoor Lighting Controls (Alignment with ASHRAE 90.1)
 - Daylight Dimming Plus OFF Controls
 - Occupant Sensing Controls in Restrooms
 - Manual ON Time-Switch Controls
13. Advanced Daylighting Design
14. Indoor Lighting Alterations
15. Outdoor Lighting Power Allowances
16. Outdoor Lighting Controls
 - Scheduling Controls: 50% Reduction After-Hours, Multi-level Capability
 - Bi-Level Motion Controlled Lighting: Remove 75 Watt Threshold
 - Bi-level Motion Controlled Lighting: 75% Wattage Reduction When Vacant After-Hours
17. Nonresidential Indoor Air Quality Measures (Proposal Based on ASHRAE 62.1-2016)
18. Proposals Based on ASHRAE 90.1
 - Fan System Power
 - Exhaust Air Heat Recovery
 - Equipment Efficiency
 - Water-side Economizers
 - Transfer Air for Exhaust Air Makeup
 - Demand Controlled Ventilation for Classrooms

¹⁴ <http://title24stakeholders.com/2019casetopics/>

- Occupant Sensor Ventilation Requirements
- 19. Prescriptive Efficiency Requirements for Cooling Towers
- 20. Economizer FDD for Built-Up Systems
- 21. Demand Response Cleanup
- 22. High-efficiency Fume Hoods in Laboratory Spaces
- 23. Variable Exhaust Flow Control
- 24. Adiabatic Condensers
- 25. Loading Dock Seals

Residential Changes to Title 24 Included:

- Code will now require renewables equivalent to total electricity use in most mixed fuel homes, which will assist in meeting state Zero Net Energy goals.
- CBECC-Res compliance software includes CO₂ emissions reporting.
- CBECC-Res includes the Energy Design Rating (EDR) that includes nonregulated loads, which is comparable to national RESNET rating. The Standards will require a passing EDR score to comply.
- More stringent envelope requirements, such as high-performance attics and quality insulation installation, will yield savings and improved comfort.
- Furnace fan power reduction (based on ATS lab testing)
- Grid harmonization features including improved demand response requirements, a battery storage credit (with more credit allowed for enhanced controls), and a limit on the PV needed for compliance.
- Changes to water heating requirements, which makes it easier to build all-electric homes

Non-residential Changes to Title 24 Included:

- Lighting power densities (LPDs) are based on all-LED lighting systems, which was the largest energy reduction measure, accounted for 55% of total Title 24 savings.
- Occupancy sensor control of ventilation simplified (based on ASHRAE 90.1)
- Automated fume hood sashes automatically close laboratory fume hoods when no one is present.
- Induction fan for laboratory exhaust systems require fan speed controls that respond to wind velocity.
- Fault detection and diagnostics requirements for economizers expanded to built-up fan systems

General Title 24 Advocacy Support Included:

- User-centered development of code language to improve enforceability in collaboration with the IOU Compliance Improvement team
- IOU-sponsored stakeholder meetings to develop consensus in advance of formal workshops
- Review and testing of compliance software
- Exposure of the largest savings measure, indoor lighting power densities, to stakeholders through the ASHRAE 90.1/189.1 process

Participation in ASHRAE 90.1 included:

- Improved LPD calculation spreadsheet tool to offer more insight into the basis of LPDs
- Model development for LPD proposals that will be considered in 2018. Our key impact was to ensure that a PNNL recommendation to use 70% lamp depreciation was not used, since this would have resulted in a 15% increase in LPD across the board.

- Expanding commercial outdoor lighting beyond what is served through the building electrical service (i.e. parking lots)
- Updates to hotel guest room HVAC and lighting controls

Support for ASHRAE 189.1 included:

- LPD proposal that reduced LPDs by 20% on average from ASHRAE 90.1-2016. Previously the standard had table of adjustment factors to the ASHRAE 90.1 values that ranged from 0.9 to 1.0. Most applications were 1.0. This set the basis for the Title 24 proposal in terms of the calculation method and created an opportunity to engage with national stakeholders on the technical issues of an all-LED basis for LPDs.
- Improved LPD calculation spreadsheet tool to offer more insight into the basis of LPDs
- Updates to daylighting requirements based on daylight autonomy calculations
- Water treatment requirement for cooling towers
- Commissioning proposal to better align with ASHRAE Standard 202
- Emission factors table for use in complying with respect to the CO₂e component of the performance approach

Implementation Challenges

Multiple barriers to acceptance exist. Concerns about the complexity of the Title 24 Standards, including the process to comply, remain a factor. Some stakeholders continue to claim insufficient properly trained labor force, and permitting delays present challenges in meeting the requirements. In addition to these acceptance barriers, a continued reduction in energy code enforcement personnel at local jurisdictions presents challenges in implementing more stringent Standards.

The trend towards increasing rigor continued in 2017 in response to industry engagement and Energy Commission input. Thus, the cost of building codes advocacy will continue to increase. Additionally, as building codes approach ZNE, a greater percentage of C&S program efforts than in prior code cycles is focused on non-EE building requirements that include DERs (PVs, batteries, inverters, DR capabilities, etc.) that are generally funded in separate non-EE proceedings. ZNE goals stated in the CLTEESP also do not fully align with the GHG reduction goals of AB 32 in terms of metrics, measurement, and milestones.

There is still room for improvement in the Title 24 Standards and supporting tools. Multi-family buildings have not been adequately addressed, even though they represent approximately half of the new residential buildings being constructed. Also, the non-residential compliance software has not been updated to reflect upcoming ZNE requirements and advanced building design practices.

Opportunities Moving Forward

In the next code cycle, the Building Codes Advocacy Subprogram will continue to pursue a reduction in complexity in the use of the Title 24 Standards, when possible, without reducing stringency. As part of this effort, the requirements for multifamily buildings may be extracted from the various sections in which they are found and consolidated into a new section that will better serve the needs of this segment of our built environment. Advocacy work may also include revising the sections that describe HVAC systems types and how they address ventilation, heat recovery and simultaneous cooling and reheating, to provide options for future savings. Process energy and plug load measures have not been significantly addressed since the 2013 code cycle. This will become increasingly important as HVAC and water heating energy use are reduced, and as new process loads represent a more significant portion of the energy use in California.

As the 2030 ZNE goals loom, a focus on the integration of commercial buildings' electrical systems with renewables, storage and the electrical grid will be evaluated in each code cycle in advance of the 2028 code cycle. It is likely that a continued blending of on-site generation, storage and efficiency measures will continue into the next several code cycles. Greater focus on nonresidential compliance software development will enable a smoother transition to meet 2030 ZNE goals.

Appliance Standards Advocacy Subprogram

The Appliance Standards Advocacy (ASA) subprogram targets both state and federal standards and tests methods including improvements to Title 20 Appliance Efficiency Regulations by the Energy Commission, and improvements to federal appliance regulations and specifications by the DOE, Environmental Protection Agency (EPA) ENERGY STAR® Program, ASHRAE, and the Federal Trade Commission (FTC). Advocacy activities include developing Title 20 code enhancement proposals, participating in the Energy Commission public rulemaking process and ASHRAE committees, submitting comment letters in federal standards proceedings, and participating in direct negotiations with industry. Additionally, the subprogram monitors state and federal legislation and intervenes, as appropriate.

2017 Strategies and Successes

The ASA subprogram supported the adoption of one of the most far reaching appliance standards in recent times – a minimum 45 lumen per Watt efficacy standard for all general service lamps regardless of technology – which took effect in California for all lamps manufactured after January 1, 2018. This Title 20 standard effectively outlaws incandescent general service "A" lamps (GSL). Lifecycle savings are approximately 10,000 GWh for GSLs and another 2,000 GWh for small diameter directional lamps (SDDL). NEMA had sued for an injunction against California implementing this standard and also for setting higher standards for LED GSLs and SDDLs. In *NEMA vs CEC*, the US District Court ruled in favor of the Energy Commission (CEC) which cleared the path for the Energy Commission to enforce the GSL standard. A similar standard is to take effect nationwide in 2020. The experience of the incandescent ban in California will be watched by other states and the federal government.

Several other ASA subprogram efforts have been pursued at the state level. ASA subprogram staff participated in several Energy Commission webinars and workshops regarding, and developed CASE studies for the Energy Commission on products including spray sprinkler bodies, irrigation controllers, commercial & industrial (C&I) fans and blowers, expanded GSL definition, solar inverter roadmap, set top box roadmap, tub spout diverters, low power mode and power factor roadmap, commercial clothes dryer test procedure and portable spas and pool pumps rulemakings. The ASA subprogram also completed laboratory testing for commercial clothes dryers with results submitted as part of the CASE studies.

The ASA subprogram advocated for changes to federal appliance standards through multiple efforts. Program staff researched and responded to specific issues related to federal rulemaking and specification processes conducted by the DOE and EPA ENERGY STAR® and participated in stakeholder meetings during rulemakings and specifications processes, resulting in ten rulemaking advocacy letters issued in 2017. Additionally, Program staff participated in DOE's Appliance Standards and Rulemaking Federal Advisory Committee meetings with DOE, industry, and other stakeholders.

ASA subprogram efforts contributed to the finalization of five DOE standards in 2017 for walk-in coolers and freezers, portable air conditioners, uninterruptible power supplies, air compressors

and packaged boilers. The IOUs responded to six Energy Star rulemaking events for specifications of appliances including computers, pool pumps, audio visual equipment, televisions, automatic commercial ice machines, and uninterruptible power supplies. Additionally, the IOUs participated in two AHRI test method development activities including the AHRI 1250 rating method for walk-in coolers and freezers and the AHRI 1230 rating method for variable refrigerant flow (VRF) multi-split air-conditioning and heat pump equipment.

Implementation Challenges

The DOE is working on federal appliance standards at a slower pace than in previous years, which reduces the ASA subprogram's opportunity to update these standards. The DOE is focused on process improvements and changes to the overall appliance standards subprogram rather than individual equipment rulemakings or test procedures. Federal preemption, which has been a significant barrier to meeting California ZNE goals, has since become a larger problem as more cost-effective, higher-efficiency technologies enter the market while the pace of federal regulation updates are slowing compared to previous years.

Opportunities Moving Forward

The Energy Commission decided to adopt several products for California standards in the absence of published federal efficiency standards. These products include portable air conditioners, uninterruptible power supplies, air compressors, and packaged boilers. These rulemakings will provide significant savings for California.

Compliance Improvement Subprogram

The Compliance Improvement (CI) subprogram supports increased compliance with the adopted Building Energy Efficiency Standards and the Appliance Standards. Compliance improvement activities complement advocacy work by maximizing verified, persistent savings from C&S activities. The CI subprogram targets market actors throughout the entire compliance chain, providing education, outreach, and technical support and resources to improve compliance with both building and appliance energy standards.

Achieving satisfactory compliance with codes and standards is a crucial requirement for capturing the intended energy savings for the long-term benefit of society. High compliance rates are necessary to level the playing field for well-intentioned suppliers and contractors who are otherwise faced with a competitive disadvantage when complying with regulations. Greater compliance strengthens voluntary subprogram baselines and provides a solid foundation for future robust advocacy efforts.

2017 Strategies and Successes

The CI subprogram launched a new, easy-to-navigate version of EnergyCodeAce.com. The training team delivered more than 120 Title 24, Part 6 standards-related traditional and virtual classroom training sessions, 20 Decoding Talks, launched a new Code & Coffee live stream series, and created a new learning block series in support of Certified Energy Analysts. Several new resources and tools were added to the Energy Code Ace library such as the "Lighting Wheel" and factsheets on computer and lamp regulations, while the T20 standards were incorporated into the Reference Ace. Additionally, the CI subprogram continued development of new dynamic compliance forms in close collaboration with the Energy Commission and designed a prototype of a user interface that industry will soon use to complete the new forms. The CI subprogram team represented all the subprogram offerings and gathered feedback at over 55 industry events throughout the state.



The CI subprogram supported compliance improvement for Title 24, Part 6 building codes through course design improvements, training sessions delivery, training material improvements, and other activities. In the area of course improvement, the CI subprogram enhanced the traditional Residential Standards Essentials course for Plans Examiners and Building Inspectors making it far more activity-based and less lecture intensive, and designed a blended learning series to support development of Residential Certified Energy Analysts. The new blended learning approach includes a combination of learning blocks that students choose to enter and complete according to their specific competency barriers. Learning opportunities are delivered in various formats including Energy Code Ace's self-study courses, virtual workshops, and mentoring.

In support of Title 24, Part 6 training, the CI subprogram delivered more than 118 live training sessions with approximately 3,000 attendees achieving an average knowledge swing of 20% and overall satisfaction rating of 92%. The CI subprogram also offered decoding webinars covering six topics related to the 2016 Standards. Each webinar was offered in three to four separate sessions, resulting in completion of 20 decoding webinars with approximately 600 attendees.

To improve Title 24, Part 6 training material accessibility, the CI subprogram redesigned the Energy Code Ace website. Sample website enhancements included easier navigation through a new overall search function and the ability to filter offerings by resource type, market actor role, topic, and standard; the opportunity to request courses and expert help; ability to view training offerings by calendar or list view; thumbnail images of resources; and a more robust Reference Ace.

Other CI subprogram activities supporting compliance improvement for Title 24, Part 6 included outreach via Energy Code Ace by distributing 70 targeted messages, responding to more than 170 requests for assistance, and participating in more than 55 industry events such as: Pacific Coast Builders Conference, California Association of Local Building Officials Education Weeks, AIA Monterey Design Conference, and the California Association of Building Energy Consultants (CABEC) annual conference. The Program also facilitated the transition of the Certified Energy Analyst (CEA) exam administration to CABEC while supporting exam revisions as needed. Additionally, the CI subprogram initiated a study designed to assess the difference in the quality of the compliance documents submitted for permits by Certified Energy Analysts and energy consultants who are not certified. Study parameters were reviewed by the CEC prior to launching the analysis so that findings may be used to support future adoption of CEA requirements.

The CI subprogram also supported compliance improvement for Title 20 Appliance Standards through training material enhancements, outreach to inform compliance improvements, and other activities. To enhance Title 20 training materials, the CI subprogram introduced a new Title 20 section of the Reference Ace and fully incorporated Title 20 into the overall Energy Code Ace website. The CI subprogram also developed a Title 24/Title 20 "master resource" which lists the equipment/products in both Title 20 and Title 24 that are required to be certified, illustrates the overlap/relationship between Title 24 and Title 20, as well as highlighting the fact that some equipment needs to be certified to the Commission for Title 24 compliance.

The CI subprogram staff conducted a focus group designed to uncover market actor needs in relation to new JA8 requirements and began developing a work plan detailing specific outreach and training activities for 2018. The CI subprogram also exhibited and gathered feedback from contractors at the Pool Industry Expo September 28 – 30 and conducted surveys aimed at

rebate customers (i.e. pool owners) and contractors in order to understand what motivates customers to repair or replace equipment, as well as how best to reach consumers with educational materials and messaging.

Other Title 20 activities included developing training specs for contractor training expected to launch summer of 2018 and conducting outreach to major retailers to garner feedback on the preliminary design of a Model-Matching Tool. The objective of the tool is to enable users to quickly compare a batch of retail model numbers with model numbers listed in the Modernized Appliance Efficiency Database System (MAEDBS) to help identify products that have been certified to the California Energy Commission; only products listed in the MAEDBS are legally allowed to be sold or offered for sale in California.

Implementation Challenges

Identifying and reaching key market actors in the Title 20 compliance supply chain has proven to be far more complex than that for building codes. New needs assessment and outreach efforts are underway to enable application of the user-centered design process which is at the core of all Energy Code Ace offerings. As noted previously, as Title 24 becomes more complex, it has become more difficult to understand and enforce by local jurisdictions.

Opportunities Moving Forward

Future opportunities include continued development of dynamic, digital tools that automate the compliance process will reduce end user frustration. The CI subprogram will also explore opportunities to simplify the use of Title 24 to increase overall compliance.

Reach Codes Subprogram

In addition to state and national building codes, the C&S Program provides technical support to local governments that wish to adopt ordinances that exceed statewide Title 24 minimum EE requirements for new buildings, additions, or alterations (reach codes). Reach code support for local governments includes research and analysis to establish performance levels and cost effectiveness relative to Title 24 by climate zone, drafting model ordinance templates to encourage regional consistency, assistance for completing and expediting the application process required for approval by the CEC, and supporting implementation once effective. The Reach Codes (RC) subprogram supports local governments seeking to establish residential or commercial energy conservation ordinances for new construction and existing buildings.

2017 Strategies and Successes

Many local jurisdictions have established goals within their Climate Action Plans to reduce energy use and GHG emissions from buildings through adopting and implementing local energy ordinances. Given the changing policy and funding priorities at the federal level, cities and counties are experiencing a greater sense of urgency for local action to meet the state's GHG emission reduction goals. This urgency has translated to a greater interest in reach codes as a path to achieve the goals. With reducing GHG emissions as the highest priority, there is a shift in focus from reducing energy use generally to specifically reducing energy use associated with carbon emissions. This shift has resulted in an increased level of interest in all-electric designs, both at the local level, and at the state.

2017 RC subprogram work included study development, technical support for local jurisdictions, reach code resource accessibility improvements, and other activities. The RC subprogram completed the following cost-effectiveness studies: CALGreen Tiers 1 and 2 for All-Electric Residential New Construction, CALGreen Tier 3 for Residential New Construction, CALGreen



Tier 1 for Nonresidential New Construction, and a study covering significant renovations in existing single-family homes for the City of Chico. The RC subprogram also began development of residential new construction study requiring heat pump water heating plus a PV system sized to offset the water heater electricity usage.

For technical support of local jurisdictions, the RC subprogram presented cost-effectiveness studies, consulted on options and opportunities, and reviewed and made recommendations on proposed ordinance structure, triggers and language. Jurisdictions included Arcata, Berkeley, Contra Costa County, Chico, Davis, Fremont, Silicon Valley Clean Energy, and the Counties of Marin and San Mateo. We also presented analysis results to BayREN members.

To improve reach code resource accessibility, the RC subprogram launched the LocalEnergyCodes.com website which contains all subprogram studies, as well as model ordinance and resolution language which jurisdiction staff may use to facilitate drafting the ordinance. Beginning from a common core helps to support consistency across jurisdictions. The web site also contains links to other providers, state agencies, and other resources. From its launch in July through December, the home page was viewed more than 7,000 times. The Nonresidential New Construction Study was downloaded most often (100 times) followed closely by the Residential New Construction CALGreen Tiers 1 and 2 Mixed-Fuel (94) and All-Electric (84) studies.

Other RC subprogram work activities included engagement with Bay Area Air Quality Management District (BAAQMD) and promotion of the CEC's model solar ordinance through technical support, review of materials, and participation in webinars about the ordinance, cost-effectiveness studies and the adoption process. The RC subprogram staff attended Statewide Energy Efficiency Collaborative (SEEC) Forum. Program staff coordinated and hosted reach codes session with the County of San Mateo and the Cities of Fremont and Santa Monica. Lastly, the RC subprogram began working with ICLEI to determine if the ICLEI ClearPath tool can be a path for tracking reach code impacts.

In 2017, several reach codes were adopted by local jurisdictions and approved by the Energy Commission, based on IOU cost effectiveness studies. Approved local ordinances may be found on the Energy Commissions website:¹⁵

- City of Brisbane, July 12, 2017, Cool Roof, Solar PV
- City of Davis, December 13, 2017, Efficiency, Solar PV
- City of Fremont, July 12, 2017, Solar PV
- City of Fremont, April 27, 2017, Lighting
- City of Healdsburg, July 12, 2017, Efficiency
- City of Lancaster, October 11, 2017, Solar PV
- Marin County, March 8, 2017, Efficiency
- Mill Valley, April 27, 2017, Efficiency
- City of Novato, April 27, 2017, Efficiency
- Town of Portola Valley, July 12, 2017, Efficiency
- City of Santa Monica, March 8, 2017, Efficiency, Solar PV

¹⁵ <http://www.energy.ca.gov/title24/2016standards/ordinances/>

Implementation Challenges

In general, reach codes have a relatively short “shelf life”. Following adoption of new building codes, compliance software must be updated to reflect new building codes before cost effectiveness (CE) studies can be completed. Then local jurisdictions adopt reach codes based on CE studies, followed by CEC approval. By the time this work is completed, there may be only year or two before the next code becomes effective. While reach codes support Climate Action Plan goals, building departments have the additional burden of verifying compliance with the reach codes and reporting those results to the planning department. This potentially unfunded mandate for the building departments has challenged the pursuit of reach codes by local governments.

Opportunities Moving Forward

Most cost effectiveness studies are conducted in response to specific requests from local governments, leading to a variety of reach codes which support implementation upcoming codes – reach codes based on 2016 codes help prepare the building industry for 2019, for example. Opportunities exists to develop tools that increase the value of reach codes to cities and perhaps advanced reach codes that better prepare the market for new codes.

Planning and Coordination Subprogram

The planning element of this subprogram includes long-term planning and scenario analyses, modeling of impacts from potential C&S program activities relative to California policy goals and incentive programs, development of business and implementation plans, responses to CPUC and other data requests, and maintenance of a C&S savings database consistent with evaluation protocols.

The coordination element includes internal and external harmonization with other groups. Internal activities have traditionally included collaboration with several departments: a) incentive, training, and demand response programs; b) policy, regulatory, and corporate affairs; and c) emerging technology and product teams. More recently, as building codes have begun to incorporate distributed generation and batteries, coordination has expanded to strategy integration, distributed generation programs, and others involved in grid management.

Since codes and standards impact the entire state and almost all building types, occupancy categories, and related technologies, external harmonization activities encompass: a) CPUC, Energy Commission, Air Resources Board, b) other IOUs, municipal utilities, and utilities in other states, c) national advocates such as ASAP, NRDC, NEEA, Sierra Club, American Council for and Energy-Efficient Economy (ACEEE), Earthjustice, National Consumer Law Center, Consumer Federation of America, d) representatives of various manufacturing companies and industry groups such as AHAM, CTA, NEMA, AHRI, American Gas Association (AGA), and e) water utilities and local governments, and f) other parts of the compliance improvement supply chain: building inspectors, Title 24 consultants, Contractor State Licensing Board (CSLB), etc.

With the current absence of a formal Zero Net Energy subprogram, the C&S Planning and Coordination subprogram has taken a lead role for coordinating the various EE and non-EE aspects necessary to effectively support customers and the building industry to meet the state’s ZNE goals. The ZNE effort is not only limited to Title 24, but also supports the California Department of General Services’ ZNE goals, schools (Prop 39), and the design and construction industry’s efforts to meet the various ZNE goals.

Implementation Challenges

The C&S program impacts EE, PV and storage technologies, utility grids, building and manufacturing industries, the compliance improvement supply chain, EE and DR programs, local governments, state and national code setting bodies, ratings organizations, etc. Planning and coordination are challenging.

Since ZNE cannot be achieved by EE alone, ZNE also requires the coordination of DERs (PV, batteries, inverters, DR, etc.), NEM-successor tariffs, interconnections tariffs (Rule 21), line extension tariffs (Rules 15 and 16), and appropriate rate tariffs which are all under the auspices of different proceedings and rulemakings. This creates funding silos that create challenges for offering integrated support to customers and the design and construction industry. These challenges are made more complicated when trying to align ZNE goals with GHG mitigation goals such as AB/SB-32.

Opportunities Moving Forward

A greater emphasis on long-term planning and specific technologies will help transition the subprogram to a more proactive disposition. A modest increase in risk will increase the likelihood that California achieves its 2030 goals.

Code Readiness Subprogram

The primary purpose of the Code Readiness (CR) subprogram is to accelerate achievement of state policy goals such as ZNE and SB350 through building codes and appliance standards through long term tactical planning, data acquisition, and industry outreach. Long term tactical planning starts with a specific code objective, such as ZNE for low-rise commercial office buildings in 2025 with a particular energy use intensity (EUI) target for the prescriptive code baseline. Technologies and disruptive systems are demonstrated with the aim of collecting high-quality information and data needed to support improvement to codes and standards; in particular, cost-effectiveness, feasibility, and compliance efficacy. In parallel with preparations for the future update to building codes, within the context of industry transformation, code readiness activities are conducted for major appliances (in office buildings for example). The subprogram targets and carries out education and training for key builders, designers, and suppliers within each specific industry.

The second objective, code-directed support for incentive programs, leverages a vast pool of C&S research (technology and market research, cost-effectiveness, impacts on manufacturers, etc.) conducted by DOE, IOUs, Northwest Energy Efficiency Alliance (NEEA), and others to accelerate the development of new measures for incentive programs.

This CR subprogram will also develop and implement a more holistic data strategy that simultaneously improves the quality of program advocacy and decreases costs. Tactics include field research surveys, online data harvesting, laboratory testing, etc.

2017 Strategies and Successes

The CR subprogram team expanded its research and planning activities in 2017, and began laying the groundwork for the development of long range tactical plans. A key element tactical planning is a measure package analysis and building simulation project to establish current Title 24 baselines and future code cycle goals that achieve ZNE goals by 2030. Modeling and simulation began in earnest in the fall of 2017 and is expected to be completed in early 2018. Various CR subprogram approaches, tools, and processes were developed or standardized, and central long-term data storage and quality assurance procedures were established. Interim

regulatory objectives for the next three Title 24 code cycles (2022, 2025, and 2028) were established for initial priority measures such as dedicated outdoor air systems (DOAS) and variable refrigerant flow (VRF) systems.

CR subprogram field research strategies continued and expanded in 2017. The CR subprogram completed installation and initiated monitoring for one commercial retrofit and two residential new construction projects that were started in 2016. Monitoring research to date is already providing insights on the performance of certain measures, including power over Ethernet LED lighting, CO2 heat pump water heaters, DOAS, VRFs, and advanced residential shell construction strategies.

Building off the success of the first commercial code readiness, commercial systems, retrofit project, a research scope was developed and recruitment began for 3-5 additional commercial retrofit sites. Recruitment efforts commenced for a field monitoring assessment of existing DOAS and VRF installations to establish and interim code step. A roof-top unit (RTU) economizer research and field study plan was developed to improve code baseline assumption. The largest element, a field assessment of 30-40 economizers, was still in the recruitment and planning stage in 2017 but is expected to be completed by mid-2018.

The CR subprogram is working with PG&E Applied Technology Services (ATS) laboratory to test prioritized appliance equipment categories. Seven categories were identified in 2017 (residential water heaters, commercial ACs, residential dryers, residential HVAC, commercial boilers, DOAS, and air-to-water heat pumps) testing plans were started to enable product testing to start in 2018. The results will be used to inform the future advocacy efforts with respect to future test procedure and standard updates, including for the DOE, ASHRAE, and AHRI test procedures.

Code-directed support for incentive programs included the transfer of code research to product and program teams for residential hot water circulator pumps, commercial/industrial pumps, pool cleaner booster pumps, and commercial/industrial fans and blowers.

Implementation Challenges

The CR subprogram entails several new activities such as tactical planning for future code cycles, a focus on whole system replacements, disruptive technologies, an industry approach to transformation, and development of a data repository that incorporates data over time from various project types. Development of new methods and program infrastructure has been challenging.

Opportunities Moving Forward

With a focus on low-rise office buildings, the CR subprogram made enough progress to demonstrate the value of code readiness principles. There are many other building types and code objectives to which this new approach may be applied.

Emerging Technologies Program

The Emerging Technologies Program (ETP) is a statewide initiative designed to reduce time-to-market for introduction of EE technology solutions aligned with the California Energy Efficiency Strategic Plan (Strategic Plan). ETP increases supply of and market demand for EE technology solutions, delivered through three core subprograms: Technology Development Support (TDS), Technology Assessment (TA), and Technology Introduction Support (TIS).

Under the statewide ETP, the TDS subprogram intends to communicate and collaborate with entrepreneurs and technology providers to increase the supply of EE technology solutions. In parallel, the TA subprogram identifies and assesses the performance of emerging EE technology solutions in all sectors that may be offered to customers with an incentive. Finally, the TIS subprogram seeks to introduce solutions to the market by exposing end users to applications of emerging EE technology solutions in real-world settings, and by harnessing third-party projects to deploy such technology solutions on a limited scale in the market.

ETP uses numerous strategies – such as Lab Testing, Field Testing, Demonstration Showcases, and Technology Resource Incubator Outreach (TRIO) – to achieve the objectives of its three subprograms.

ETP enables PG&E to reduce certain market risks by testing and benchmarking new and innovative products, services, and market solution approaches. This helps downstream subprograms understand potential barriers – technical or non-technical – to high adoption rates for new EE technology solutions.

Opportunities Moving Forward

In 2018, PG&E will maintain its focus on expanding the pool of new and innovative ideas and solutions that can be offered to customers. Based on EE market and technology trends, PG&E will place emphasis on integrated solutions (HVAC with lighting, demand response, distributed generation, etc.), data analytics, and software-based solutions to help deliver greater value to the customer and drive higher adoption rates. The advent of software controls combined with high-quality, reliable end user energy consumption and demand data, enables PG&E to target increasingly granular end use solutions and further engage customers in realizing long-term Strategic Plan goals.

Testing Innovative Solutions through the Emerging Technologies Program

PG&E's Emerging Technologies (ET) team actively seeks out new, innovative technology solutions and market approaches, soliciting ideas from both internal and external EE stakeholders to assess potential new technologies for PG&E's EE portfolio in a strategic way. ETP enables PG&E to test and benchmark new and innovative products, services, and market solution to help bring our customers new and improved opportunities to save energy.



Emerging Technologies Subprograms

Technology Development Support (TDS) Subprogram

The TDS subprogram assists entrepreneurs, investors, and technology providers in developing new or improved EE technologies and solutions for the marketplace. IOUs are strongly positioned to undertake targeted, cost-effective activities that provide value in support of private industry product development efforts, decreasing innovator uncertainties. Broadly, the ETP seeks targeted opportunities to support EE product development. Product development constitutes the process of taking an early-stage technology or concept (including at the Research and Development (R&D) stage) and transforming it into a product that meets a market need. ETP supports product development through TRIO roundtables, symposia, and other means. TRIO provides support and networking for EE and DR entrepreneurs, investors, and universities with the goal of providing participants with the requisite perspective and tools to work with IOUs. TRIO symposia educate technology developers about the requirements that IOUs must apply when considering new technologies and solutions for inclusion in IOU EE programs. TRIO roundtables are targeted to a smaller audience and have focused on market demand and technological innovation, prior to a full ET assessment (see below). Supplementary to TRIO support, market and behavioral studies investigate the market potential for early-stage technologies and solutions. Ultimately, the aim of the TDS subprogram is to communicate and collaborate with entrepreneurs and technology providers to increase the supply of EE technology solutions, including breakthrough technologies and highly disruptive innovations, to the market.

Technology Assessment (TA) Subprogram

Through the TA element of ETP, energy-efficient technology solutions that are either new to the market or underutilized for a given application are evaluated for performance claims and overall effectiveness – namely cost and end customer attractiveness – in reducing energy consumption and peak demand. Two key objectives of these assessments include 1) the adoption of new measures into PG&E's EE portfolio, and, 2) the deeming of specific technology solutions as *not* market ready. Historically, TAs have been a core strength of ETP and have provided critical support to EE programs. ETP assessments may utilize data and information from different sources to support assessment findings, including: in-situ testing (customer or other field sites), laboratory testing, or paper studies. In addition to other findings and/or information, assessments typically generate some – and in rare cases, all – of the data necessary for EE rebate subprograms to construct a workpaper estimating energy and demand savings over the lifetime of the measure. Furthermore, technology solutions that are designated as 'not market ready' nonetheless intend to assist technology providers in enhancing their offerings for the EE marketplace.

Technology Introduction Support (TIS) Subprogram

The TIS subprogram supports the introduction of new technology solutions to the market, albeit on a limited scale, through several activities. Scaled Field Placement (SFP) projects are the deployment of a technology solution at multiple, participating customer sites as a key step to gain market traction and feedback. Typically, such measures have already undergone a technology assessment or similar evaluation to minimize the risk of failure. Demonstration and Showcase projects are designed to provide key stakeholders the opportunity to thoroughly vet and understand the value of proven technology solutions that advance ZNE, IDSM, and other Strategic Plan goals. The overall aim of demonstration showcases is to introduce technology solutions to stakeholders from a systems and potentially integrated level rather than an individual (widget-based) perspective using data gathering and customer feedback in a non-

simulated environment. In addition, the demonstration showcase exposes the technology solution to the broad public, investors, entrepreneurs and technology professionals, and increases market knowledge for the technology provider. Market and behavioral studies are designed to perform targeted research on customer behavior, decision making, and market behavior to gain a qualitative and quantitative understanding of customer perceptions and acceptance of new technology solutions and business models, as well as market readiness and potential for new EE measures. Finally, the Technology Resource Innovation Program (TRIP) solicits third-party projects – of up to \$300,000 per project – to deploy ET on a limited scale to the market.

2017 Highlights

In 2017, PG&E and the statewide ETP initiated five TIS and one TDS projects. PG&E also hosted the 2017 Emerging Technologies TRIO Symposium and Roundtable¹ and the Q3 Emerging Technologies Coordinating Council (ETCC) quarterly meeting, while supporting the statewide IOU ETP team in planning and preparations for the 2017 ET Summit (hosted by SoCalGas). The 2017 TRIO Symposium and Roundtable sought to educate investors, entrepreneurs, academia, and other technology professionals on the following core elements of how to partner with utilities for bringing to market new EE technology solutions, with a focus on the following:

1. How utilities are leveraging technology trends such as the Connected Home to support customers
2. How technology partners can leverage utility data platforms for customers
3. How technology partners can participate in new meter-based savings platforms through PG&E's Residential Pay-for-Performance efforts

Details around PG&E's completed ETP projects are accessible via the ETCC website: <http://www.etcc-ca.com>. Examples of three of these projects are provided below.

LED T8 Lab Evaluation

The goal of this project was to evaluate linear light-emitting diode (LED) lamps intended to replace equivalent linear fluorescent systems when operating under real-world conditions expected of commercial retrofits and in fixtures other than recessed troffers. Project objectives included evaluation and documentation of product performance as compared to a standard linear fluorescent baseline in terms of photometrics, energy use, and cross-compatibility of products within linear LED lamp type categories A and C. Ultimately, the project recommended that linear LED lamp products be included for incentives in the EE portfolio for commercial customers.

Smart Water Heater Controller

Smart water heater controllers with learning capabilities easily install on existing gas/electric storage water heaters, providing both efficiency savings and significant DR potential. The controller enables remote monitoring and control of hot water energy use, provides system optimization, reduces standby loss by learning usage patterns, and engages consumers with messaging including equipment schedule suggestions, leak detection, and maintenance alerts. This project conducted a lab study to validate product performance/capabilities and quantify direct energy savings, with a potential Phase II review of DR functionality. However, the project determined that there are no substantial savings in energy consumption as a result of using smart water heater controllers (even though DR potential may still exist).



Conveyor Dishwasher

High-efficiency conveyor dishwashers claim to potentially deliver 70% energy and water savings compared to conventional conveyor dishwashers installed in commercial kitchens. They may even deliver great savings per installation since many older dishwashers are poorly maintained, using a lot more energy and water than specified. The ET project consisted of monitoring the energy and water use of an existing flight-type conveyor dishwasher at one location, and installing, monitoring, and showcasing the best-available conveyor dishwashing technology in another location, and included a comparative analysis between all four tiers of commercial flight-type dishwashers. The project's final recommendation was to include incentives for highly efficient, best-in-class conveyor dishwashers in the EE portfolio.

Workforce Education & Training

As part of meeting its ambitious EE targets, California recognizes the need for a well-trained workforce that has the knowledge to recognize EE opportunities and the skills to act on those opportunities. PG&E's Workforce Education and Training (WE&T) Program provides professionals who design, build, and operate buildings the relevant skills needed to help eliminate unnecessary energy use in buildings.

PG&E's WE&T Program staff continued to demonstrate leadership in the local, state, and national EE workforce arenas in 2017. While administering three WE&T subprograms—Planning, Centergies, and Connections—PG&E's WE&T team also provided technical advice to local workforce development organizations, post-secondary educational institutions, and trades' training programs. WE&T staff also presented at regional and national workforce development and technical conferences and serve as technical EE advisors to PG&E's other DSM programs and to external industry groups.

2017 Key Initiative

On-demand platform for improved training quality and customer experience

In 2017, WE&T staff successfully re-launched on-demand, web-based training by migrating its existing on-demand classes to a new online learning platform. Between August and December, over 300 participants registered for on-demand classes through a seamless single-sign-on process originating with the WE&T online student portal. In 2017, participants had over 30 on-demand classes to choose from; additionally, WE&T staff conducted a class development needs assessment and prioritization exercise, identifying 12 additional class topics to pursue in 2018. Moving forward, on-demand training will play an increasingly more important role in "blended" or "flipped" learning where students complete prerequisites for advanced-level classes via on-demand classes. Once the prerequisites have been met, students are then eligible to register for more focused in-person classes that include hands-on and instructor-led exercises.

Strategies and Successes

2017 was a year of delivering EE WE&T subprograms, educational materials, technical advice, community outreach, and tools from our lending library to a diverse set of building professionals who have the potential to design, build, and operate in ways that will save energy in the short and long term.

PG&E's Connections Helps Build Green Career Pathways for our Future Workforce

Energize Schools prepares high school students for energy careers and higher education programs through sustainability project-based curriculum, teacher training, and student-led action projects.

Training includes hands-on training that fulfills Career and Technical Education (CTE) standards and includes providing students experience building circuits, solar systems, and wind turbines, while helping students meet UC admissions requirements.



High School Green Technology Instructor teaches students proper electrical wiring techniques.

Opportunities Moving Forward

One opportunity for the WE&T Program includes the statewide third-party solicitations—Career Connections and Career and Workforce Readiness (CWR)—both proposed to be led by PG&E. In the case of Career Connections, PG&E will seek implementers who can build upon past successes in serving the K-12 community, while in CWR, we will expand our WE&T offerings to target disadvantaged workers.

Career Connections will provide energy education and career awareness materials and resources to future generations of California's energy workforce (kindergarten through high school students) and their teachers. The overarching goal for Career Connections is to educate K-12 students on EE and to expose them to career opportunities and pathways in the EE sector.

The Career and Workforce Readiness subprogram will support disadvantaged workers who lack the EE expertise and resources to enter the energy workforce. CWR will integrate social services provided by workforce development organizations with IOU funding to create or enhance an EE component of those organizations' training programs. The overarching goal for CWR is to extend EE knowledge, skills, and career opportunities to disadvantaged workers.

WE&T Subprograms

WE&T Planning

WE&T Planning develops the framework for planning, coordinating, and implementing WE&T activities, partnerships, and recommendations to meet WE&T goals. WE&T Planning also makes subprogram modifications to evaluate and incorporate market and stakeholder demand.

2017 Strategies and Successes

In 2017, PG&E led the effort across IOUs to standardize on the post-course evaluations and on the job classifications that all energy centers are using in 2018. The post-course evaluations now include the same questions across IOUs, and address the outcomes of knowledge gain and changes to workplace practice that the IOUs included in their Business Plans. Knowing if students' knowledge has increased or if they will use the course material as part of their jobs is important to our on-going effort to make the classes useful and relevant. These data points will also be part of WE&T metrics and goals. Furthermore, they provide baseline data for future EM&V studies for process and/or impact evaluations. In 2017, PG&E also led the statewide effort to have an agreed-upon list of job classifications that the IOUs can use for marketing purposes, for developing statewide metrics, and for data comparison across IOUs.

In December 2017, PG&E hosted the statewide WE&T Stakeholder Engagement forum. The forum included panelists from various segments of the WE&T landscape, including the California Energy Commission, the California Community College Chancellor's Office, and the California Division of Apprenticeship Standards. Other panelists provided insight from the architecture, engineering, EE subprograms implementer, and workforce investment board communities. The seven panelists shared their thoughts on the dynamic nature of EE goals in California, how California's workforce can best be supported to meet those energy goals, and how each of their organizations can contribute to the collective effort of building a highly skilled energy workforce.

WE&T Centergies

PG&E's WE&T Centergies subprogram consists of three Energy Centers—the Pacific Energy Center (PEC) in San Francisco, the Energy Training Center (ETC) in Stockton, and the Food Service Technology Center (FSTC) in San Ramon. These energy centers target the EE workforce in several market segments, including agriculture, foodservice, commercial, industrial, SMBs, and residential. Centergies provides in-person and web-based education and training programs, technical advice, research assistance, outreach events, and building performance tool loans. The classes offered through the energy centers received student satisfaction ratings of over 98%, and the Tool Lending Library (TLL) received over 99% customer satisfaction ratings. The number of classes and services offered are summarized in Table 2 below.

Table 2: 2017 Centergies Classes and Attendees

Number of Classes	Number of Attendees	Number of Tool Loans	Number of Distinct Tool Lending Library Projects
353	7,843	671	553

2017 Strategies and Successes

For 2017, the TLL provided tools for 671 loans for 553 distinct projects. Like previous years, most of the loans were commercial power and energy projects. In August 2017, the Energy Centers' Tool Lending Library replaced its existing tool management software with myTurn, a cloud-based tool reservation and tracking system. Advantages of the migration to myTurn include faster response times, more reliable tool tracking, efficient loan processing, and improved technical support and data security at lower cost. The myTurn system first went live at the Pacific Energy Center location, and adoption at our Stockton Energy center location is underway.

In addition to the operating efficiencies gained through the adoption of myTurn, a key strategic advantage is how it positions PG&E's Tool Lending Library for improved statewide collaboration with other IOU Tool Libraries. Southern California Edison has explored the possibility of adopting myTurn, and San Diego Gas and Electric has adopted myTurn for their online tool management system for implementation in 2018.

PG&E also led the collaboration effort across all four IOUs around commercial food service. The four IOUs agreed to develop a co-fund agreement to consolidate work around certain types of common commercial food service activities. This is a first step toward establishing an industry consortium model for commercial food service.

Additionally, WE&T staff improved marketing efforts aimed at attracting new people to WE&T offerings and better engaging occupations with a high EE opportunity. Several strategies were implemented in 2017, including: development of a consistent set of marketing collateral, three general awareness (i.e. newsletter) email campaigns, website upgrades, digital marketing through platforms such as LinkedIn, and the re-launch of a printed class calendar. For each strategy, WE&T staff collected data to inform future marketing decisions driven by cost effectiveness.



WE&T Connections

The Connections subprogram provides teaching resources for K-12 and college instructors as well as EE and green career awareness and exploration programs for K-12 and college students. PG&E's WE&T Connections subprogram includes Energenius (pre K-8), PEAK (K-8), Green 360 (7-12), Energize Schools (9-12), and Energize Colleges (postsecondary).

The three Statewide Connections programs (PEAK, Energize Schools and Energize Colleges) launched in 2016 and continued in 2017 to provide sustainability education opportunities, green career awareness, and experiences in collaboration with schools and community organizations.

2017 Strategies and Successes

In 2017, the PG&E Connections subprogram continued to develop collaborations with community education and workforce development organizations to support expanded student reach as well as provide additional learning opportunities for green career awareness, pathways, and experiences.

The PEAK program facilitated several partnerships that focused on disadvantaged communities including CSU East Bay Institute for STEM Education which facilitates the CIRCLE Labs after school programming to underserved communities, The PEAK program encouraged students to develop a deeper understanding and appreciation regarding their favorite STEM subject and encouraged them to pursue a STEM-based career in the future. An ongoing partnership with Emeryville CIRCLE Labs helps to facilitate a continued and powerful after-school presence. Continually, hosting lessons across multiple grades helps guide the cradle-to-career continuum within STEM programming.

The Energize Colleges program had commitments from twelve Community College and UC/CSU campuses across the IOU territories to support the program with resources and financial commitments. In 2017, most Energize College campuses began paying 50 percent for the 12 campus coordinators (Fellows) and 168 college interns hired across campuses, thus beginning the transition to ongoing campus ownership of the Energize Colleges program.

Five Fellows were in place at campuses in the PG&E service territory in 2017. They were responsible for hiring, placing and supervising a total of ninety-one interns. The student interns led EE, water efficiency, renewable procurement, and transportation planning projects on campus, at local businesses and high schools. At Skyline College, an intern supported new campus LEED building construction. UC Merced interns supported Yosemite Continuation High School student sustainability career discussions and residential circuit projects. Fellows and interns also collaborated with college professors to incorporate EE, demand response, and distributed generation concepts into new and existing courses and to initiate seven campus and community projects. Students will have the opportunity to earn credit toward a 4-year college or university degree while in high school or community college. The goal of this project is to create a replicable model for high school to college to energy career pathways.

Upon completion of their internship, 80 percent of interns who responded to the survey reported feeling prepared or very prepared for an entry-level job within an energy career pathway. Of respondents, 91 percent reported that their experience in the program has greatly encouraged them to pursue a career in an energy pathway.

The Energize Schools and Energize Colleges programs provide students opportunities to build transferrable career skills through project- and work-based learning opportunities. Partnerships with community organizations help provide additional instructional opportunities for Energize



Schools high school students. IBEW Local 340 and SunPower worked alongside the students of River City High School's (RCHS) Engineering and Science Academy and garden program to complete a solar installation that will supply power to the school's greenhouse. The installation will also be used as an instructional opportunity for all classes at RCHS.

Integrated Demand-Side Management

The Strategic Plan recognizes the integration of DSM options, including EE, demand response, and distributed generation, as fundamental to achieving California's strategic energy goals. To support this initiative, the IOUs have identified IDSM as an important strategic DSM policy priority and have proposed a series of activities, pilots and other subprograms in response to the Strategic Plan DSM Coordination and Integration Strategy.

The statewide IDSM program focuses on the following initiatives:

- 1) Development of a proposed method to measure cost-effectiveness for integrated projects and programs including quantification and attribution methods that includes GHG and water reductions benefits and the potential long-term economic and electric/gas hedging benefits.
- 2) Development of proposed measurement and evaluation protocols for IDSM subprograms and projects.
- 3) Review IDSM-enabling emerging technologies for potential inclusion in integrated programs.
- 4) Development of cross-utility standardized integrated audit tools using PG&E's developed audits as a starting point.
- 5) Track integration pilot programs to estimate energy savings and lessons learned and develop standard integration best practices that can be applied to all IOU programs based on pilot program evaluations and the results of additional integration promoting activities (i.e., EM&V and cost-benefit results).
- 6) Develop regular reports on progress and recommendations to the CPUC.
- 7) Organize and oversee internal utility IDSM strategies by establishing internal Integration Teams with staff from EE, DR, DG, marketing, and delivery channels.
- 8) Provide feedback and recommendations for the utilities' integrated marketing campaigns including how the working group will ensure that demand response marketing programs approved as Category 9 programs are coordinated with EE integrated marketing efforts.

Achieving IDSM Objectives

PG&E continues to work towards taking a holistic approach to customers' needs when offering potential solutions to customers. Collaboration is a focus amongst many different internal departments including energy efficiency, demand response, rates, customer support, emerging technology, electric vehicles, net metering, energy assistance and others to develop the offer the right solutions, to the right customer, at the right time. PG&E continues to emphasize the importance of this approach throughout the organization.



2017 Strategies and Successes

Statewide IDSM

The IOUs have developed well established processes ensuring delivery of integrated messaging via marketing, education, and outreach to residential and business customers. Delivery of IDSM marketing has become more than just promotion of multiple programs within



specific tactics like collateral or websites. It is now a key component in the planning phases of integrated marketing, education, and outreach to help provide the right solutions to the right customer, at the right time.

PG&E's IDSM Efforts

PG&E's 2017 IDSM efforts focused on providing thorough training to staff regarding IDSM objectives. The cornerstone of the training program was to host our annual IDSM summit in March 2017 to increase knowledge and awareness on integrated approaches, meet regulatory compliance directives, and to promote communication between all divisions and departments. Account representatives and select program advisors were also encouraged to emphasize customer segmentation in their approaches.

PG&E also developed integrated marketing campaigns and collateral continued throughout the year for business and for residential / smaller business customers. Furthermore, PG&E's Marketplace continued to expand for customers to quickly and easily shop for energy saving products and services offered by third-party retailers. It is designed to help users save money through an easy-to-use tool that will help generate greater energy awareness, education, and empowerment for customers to act.

From an IDSM technology perspective, PG&E continued to provide demand-response-enabled programmable-communicating thermostats to both residential and commercial customers. Additionally, the ETP team reviewed several projects. One that continued its importance in 2017 is the ZNE Builder Demonstration Project. To move motivated production builders toward the state's ZNE goals and help them to get ahead of the curve, PG&E is running a ZNE Production Builder Demonstration project. The overall goal is to help production builders develop a new ZNE prototype or upgrade one of their existing prototypes to ZNE by providing support from start to finish. This includes design support, construction inspections, incremental cost assistance, and performance monitoring of the completed home.

Financing Program

PG&E's EE Financing program is designed to help customers finance the up-front cost of EE projects. The statewide Financing program is offered in conjunction with other PG&E EE programs to stimulate and enable higher levels of customer participation.

2017 Key Initiatives

On-Bill Financing Program Improvements

During 2016, PG&E implemented a new option for project qualification for OBF. 2017 saw the roll out of that process, gaining adoption from market participants and customers. The new process affords project developers and customers more flexibility in how they implement their project. This flexibility allows customers to get measures tailored to their needs and drive the process and timeline themselves.

2017 saw an expansion of loan terms available to government agencies and multi-family buildings and customers that can now obtain a loan of up to \$2 million per site for their project.

PG&E's Finance team continues to focus on delivery of the OBF subprogram to ensure that the subprogram meets the needs of our internal and external partners, as well as our customers. The subprogram continued its growth and now has fully revolved the loan fund.

Financing Pilots

Throughout 2017, PG&E and the statewide Financing team worked closely with Commission Staff, the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA), and the Center for Sustainable Energy on the development of the Statewide Finance Pilots.

2017 Strategies and Successes

PG&E's EE Financing subprograms facilitate portfolio energy savings by allowing customers to pursue large, comprehensive efficiency retrofit projects that might not have been financially feasible otherwise. In 2017, the OBF Program maintained its strong growth in financed projects, totaling 553 loans issued for \$24.2 million. PG&E has also continued collaborative efforts with the Statewide IOUs and CAEATFA, to develop financing pilots that will offer more flexible terms to a broader array of customers.

PG&E's EE financing subprograms allows customers to pay for their EE projects as they save money on their energy bill. Doing so allows them to undertake more comprehensive projects and, in some cases, projects that would not have been feasible without financing.

PG&E's OBF Program Continues Growth in 2017

In 2017, PG&E maintained the success of the OBF program while making significant investments to improve processing time and scalability for the future.

OBF delivered 553 loans across the agricultural, commercial, institutional, industrial and multifamily sectors in 2017, 39% over the 398 loans extended in 2016.





Opportunities Moving Forward

For the OBF Program in 2018, PG&E will continue to seek operational efficiencies with our web-based application system, thereby increasing the speed of project implementation and payment. This in turn will enhance OBF's value as a tool for increasing investment in EE, and the realization of related savings, across the PG&E service territory. Faster project implementation will drive increased customer interest and uptake from channel partners.

PG&E will seek widespread adoption of the new option for qualifying projects for OBF that will not require participation in a rebate or incentive. This will open financing to projects that do not fit into standard measure-based subprograms, expanding opportunities for customers and contractors. It will also allow for quicker processing and payment of OBF loans.

Financing Subprograms

On-Bill Financing

OBF is a key enabler of energy savings across customer classes, providing zero percent financing for qualifying EE retrofits, with loan payments appearing as fixed monthly charges on the customer's PG&E bill. OBF helps customers, who would otherwise have difficulty qualifying for or using commercial credit, get over the first-cost hurdle to EE investment, unlocking broader and deeper cost savings while supporting PG&E's energy savings targets.

OBF Bridges the Finance Gap for PG&E's SMB Customers and Delivers Significant Savings

The SMB customer segment saw particularly strong growth, with the number of new SMB loans increasing 22 percent.

2017 Strategies and Successes

The OBF Program issued more than \$24 million in new loans to 553 customers. Overall, OBF saw a 39% increase in total loan volume and a 22% increase in SMB loans. PG&E's marketing team created new case studies and marketing materials, which led to a strong increase in new applications, particularly from the SMB segment.

Financing Pilot Subprograms

The IOUs are developing a set of statewide Financing pilot subprograms designed to encourage private lenders to offer financing products specifically for EE projects by offering both credit enhancements in the form of loan loss reserves, and the option of loan collection by the utility on behalf of the lender (On-Bill Repayment or OBR).

The pilots include ratepayer-supported credit enhancements (CE) for residential properties and small businesses. The CEs are expected to provide additional security to third-party lenders and private capital so they can extend or improve credit terms for EE projects.

The first of these financing pilots, the Residential Energy Efficiency Loan Assistance Program (REEL), was introduced in 2016, and has provided support for over \$2 million in unsecured residential EE loans.

Third-Party Financing

PG&E funded two American Recovery and Reinvestment Act (ARRA) continuation subprograms. The emPower SBC Program is administered by the County of Santa Barbara and is a joint co-funding effort between PG&E, Southern California Edison Company (SCE) and



Southern California Gas Company (SoCalGas). The subprogram leverages ARRA funding to create a public-private partnership between the County, all eight incorporated cities, the Home Upgrade Program, and two local credit unions.

The Golden State Finance Authority Loan product uses a loan loss reserve to make financing available specifically for EE projects. The loans are available across the PG&E territory and can provide up to \$50,000 of funding to customers at affordable rates. The subprogram is important as it provides an option for customers looking to perform whole house retrofits under the Home Upgrade Program.

Water Energy Nexus

Customers across all segments are acutely aware of water constraints in California. 19 percent of statewide electricity (kWh) is associated with water consumption including long haul transport of water, the supply and treatment of water and wastewater, groundwater pumping and end-use water heating and pressurizing. Approximately five percent of statewide electricity use (or 12,754 GWh) is used for treating and moving water and wastewater.¹⁶ When a customer saves water on their site, it reduces the energy used to provide that water to the customer, i.e., the embedded energy. PG&E's EE programs aim to assist customers and partners in achieving their broad conservation goals where both water and energy typically go hand in hand.

Throughout 2017, PG&E continued its success in water EE by offering customers several options to reduce their water use, including EE rebates for high-efficiency appliances, such as clothes washers and shower heads. We also offered incentives to commercial customers, including equipment such as ice machines, combination steam cookers and pre-rinse spray valves. Agricultural customers received incentives for converting from sprinkler systems to water-efficient drip irrigation, as well as programs for energy-efficient pumping systems and more.

Key Initiatives

In 2017, PG&E continued integrating the Water Energy Cost Effectiveness Calculator (Water Energy Calculator) into EE offerings. The Water Energy Calculator, originally developed by the CPUC, calculates the energy used to produce, deliver and dispose of potable water. It allows PG&E to capture energy savings above and beyond site-specific energy savings from measures like low flow showerheads or clothes washers.

In May 2017, San Diego Gas and Electric (SDG&E) submitted a water savings workpaper on behalf of the IOUs. PG&E began tracking water and embedded energy savings and reporting these numbers to the CPUC Energy Division (ED) via email. Once the workpaper is uploaded to CEDARS, PG&E will begin officially submitting this data in CEDARS.

In August 2017, the Joint IOUs filed a Water Energy Nexus Cost Calculator Plan of Action, detailing recommendations for implementation of the calculator. The Plan of Action was approved in December 2017.

PG&E's Water Savings

Altogether, customers who participated in PG&E's programs reduced water usage by about 210 million gallons in 2017, based on an analysis of our most common energy efficiency measures that deliver water savings.



¹⁶ California's Water Energy Relationship; Prepared in Support of the 2005 Integrated Energy Policy Report Proceeding (04-IEPR-01E). CPUC. 2005.

PG&E continued work on the pilot launched in 2016 to further our understanding of opportunities for electric utilities and water agencies to collaborate. This pilot focuses on the use of Advanced Metering Infrastructure (AMI) to deliver water savings data. This pilot measures the value of communicating AMI dependent data (i.e., information collected and conveyed at an hourly temporal resolution at a minimum) to consumers in terms of household water, electricity, and gas consumption. The project will provide information on how behavior based messaging affects both energy and water savings in the residential sector. This pilot is expected to be completed in 2019.

PG&E also completed a comprehensive market assessment to evaluate how management of agricultural energy and water use can be improved with access to improved data. As part of the assessment, types of information that can assist in improving farmers' management of energy and water and specific software and hardware available to customers were identified. The project also investigated: current approaches to irrigation scheduling and operations, emerging tools and best practices, barriers to adoption and how information leads to problem awareness and action. PG&E shared the assessment with key stakeholders in the agricultural community.

2017 Strategies and Successes

For agricultural customers, PG&E continued providing rebates for sprinkler to drip irrigation which increases the efficiency of the customer's water application and reduces waste. Additionally, the APEP, a joint service provided by PG&E and the California State University, Fresno, continued to offer an educational and incentive program to improve overall agricultural pumping efficiency and encourage energy conservation.

In addition to working with the water end users, PG&E also continued its successful subprograms specializing in helping water agencies and public water districts improve EE. For more information on our targeted third-party subprograms, see the Third-Party Industrial Program section.

Implementation Challenges

Integrating the Water Energy Calculator into PG&E's EE offerings has faced various challenges including agreement on the right reporting structure, proper definition of IT system updates, and general discussions on subprogram design guidelines. PG&E worked with key stakeholders to address most questions but long-term considerations need to be made about where savings attribution for Water-Energy projects will live.

Collaboration between water utilities and energy utilities in standing up new offerings and finding new avenues to deliver savings will be critical. However, water utilities and energy utilities face differing incentives, savings reporting methodologies, and organizational challenges. Reconciling these differences will be a significant challenge over the coming years.

Opportunities Moving Forward

PG&E will continue to offer water-saving opportunities for key segments that would maximize our impact on water-energy usage including residential customers, the agricultural sector, and water and wastewater districts.



Descriptions and Strategies – Local Programs

Covering 70,000 square miles in Northern and Central California, and serving 15 million people, or 5 percent of the U.S. population, PG&E's territory and customers are very diverse. Over 80 languages are spoken throughout PG&E's territory, covering very rural to urban communities, with a diverse residential, commercial, agricultural and industrial base. To serve this diverse group of customers, PG&E leverages local partnerships and third-party programs to serve targeted and niche markets, harder-to-reach segments and to focus customer groups with specific needs. This section describes PG&E's 2017 strategies and accomplishments for the following local programs:

Government and Community Partnerships

- Institutional Partnerships
- Local Government Partnerships

Third-Party Programs

- Residential Sector
- Commercial Sector
- Industrial Sector
- Agricultural Sector

Government and Community Partnerships

PG&E's Government and Community Partnerships (GCP) are collaborations with public entities that shape EE and sustainability at the local, regional, and statewide level. These partnerships aim to meet the needs of local and state government, and schools and educational institutions to offer comprehensive solutions that are flexible, innovative, and a reflection of the communities' needs.

PG&E's GCP team administers 22 Local Government Partnerships (LGPs), as well as four Institutional Statewide Partnerships with California Community Colleges, University of California/California State University (UC/CSU), the State of California, and the California Department of Corrections and Rehabilitation. The GCP team also supports K-12 public schools and offers energy planning services for public entities interested in benchmarking their facilities and pursuing local energy reach codes and ordinances. In addition, GCP offer an LED streetlights subprogram serving public sector customers.

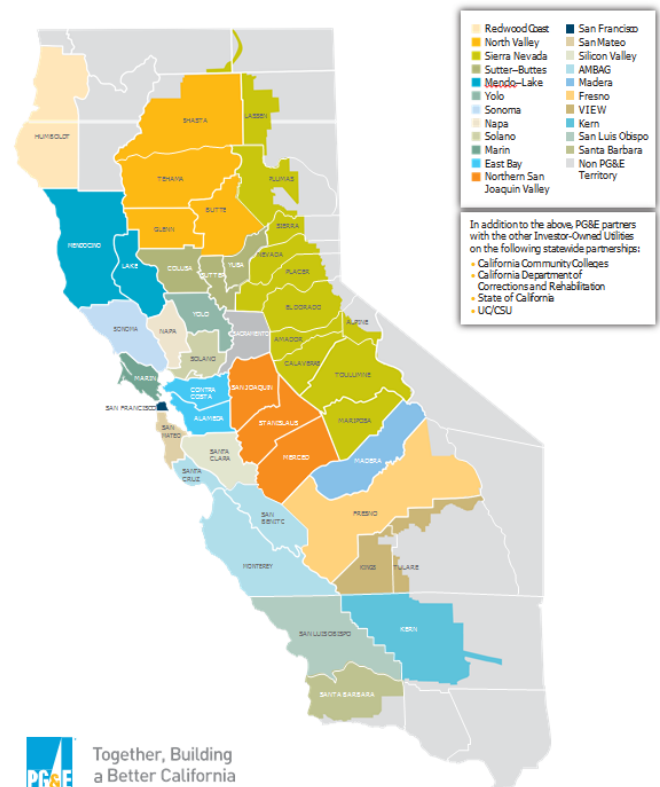
LGPs are PG&E's primary vehicle for serving commercial small medium businesses (SMB) as these customers are frequently made aware of PG&E's offerings because of the outreach conducted by the Energy Watch subprograms. Learn more about Energy Watch subprograms in the LGP section.

Key Initiatives

In 2017, GCP continued significant enhancements to its suite of nine Regional Direct Install subprograms. These subprograms are directed by a consistent set of program policies and guidelines, including the alignment of incentives across each subprogram. The enhanced incentive for Hard-to-Reach customers, launched in 2016, continued and helped ensure underserved small businesses, non-profits, and local governments could continue to participate in these comprehensive subprograms.

PG&E used Energy Insight, a cloud-based customer relationship management, project tracking, and collaboration platform to manage the Regional Direct Install programs. Energy Insight is designed to more efficiently track EE projects, automate processes, and keep Program Managers abreast of project and program updates, offerings, strategies, and policies.

Government and Community Partnerships 2017–2018





To improve the effectiveness of program outreach and customer acquisition efforts, GCP leveraged data analytics to develop lists of high potential customers and utilize these lists to target customers with Regional Direct Install programs and other PG&E offerings.

In addition, GCP played an active role in supporting the Targeted Demand-Side Management (TDSM) Initiative, a multi-year campaign focused on leveraging existing demand-side programs, including EE, to reduce peak load on specific substations leading to deferral or reduction in distribution capital spending. GCP significantly contributed to the TDSM initiative's goal achievement by way of the geographically focused nature of GCP-led Regional Direct Install programs.

Also in 2017, GCP continued laying groundwork for program innovation and driving cost-effectiveness through a distinct Public Sector Chapter within 2018-2025 Business Plan. The Public sector was created to allow PG&E to focus on the diverse and distinct needs of government agencies, including K-12, local governments, public universities, states agencies, and federal facilities. In preparation for the approval of the Business Plan, the GCP team initiated working groups to develop and refine our strategy for the future state of partnerships and approach for serving local governments and SMBs. The work included defining LGPs' role in effectively serving local government and public K-12 school customers, setting an overall segment goal that each LGP will contribute to, as well as preparing for the third-party solicitation process.

2017 Strategies and Successes

Government and Community Partnerships are focused on delivering energy savings by bringing innovative strategies to customers that encounter unique barriers to adopting EE measures compared to those of larger and well-resourced commercial facilities.

Through Energy Watch partnerships, SMB customers are served by the Regional Direct Install program model. Partnership-implemented Regional Direct Install programs deliver over half of the SMB energy savings achieved by PG&E's downstream EE portfolio. Underserved small and medium commercial customers typically need additional support in designing and managing EE projects. In response, the Direct Install model provides participants with a turnkey program offering, project scoping and audits, technical assistance and financial incentives to enable these customers to pursue EE.

In March 2017, the CPUC issued a resolution that updated and superseded prior requirements on the activity of claiming Early Retirement. This resolution provided critical clarity and objectivity on the preponderance of evidence required for substantiating Early Retirement claims. As this had been a significant challenge for Regional Direct Install implementer, the CPUC resolution was operationalized for use by our Regional Direct Install programs and implemented in June 2017. This significantly reduced the confusion and subjectivity around Early Retirement, and created a greater level of comfort among implementers that had previously been reluctant even attempt leveraging this option.

Since the CPUC approved utilities to pay rebates and claim savings for utility-owned streetlights in 2016, the GCP team took initiative to ensure that customers with streetlights on LS-1 rates knew that such rebates were available to encourage them to switch out inefficient high-pressure sodium-vapor bulbs with long-lasting and energy-saving LED lamps. PG&E completed streetlight upgrades across 17 different partnership areas, ranging from small projects of a dozen lights to massive projects of thousands of lights.



The Moderate Income Direct Install (MIDI) program is a Residential EE program which offers no-cost installation of prescriptive EE measures, home energy audits, and customer education. MIDI operates in coordination with local partners by targeting customers who are just above the low income threshold for PG&E's Energy Savings Assistance program and need assistance with implementing EE improvements. In 2017, PG&E transitioned the management of the MIDI subprogram from the GCP team to the Residential team to enable strategic alignment with other Residential Direct Install programs. The transition of MIDI to the Residential program facilitates improved coordination and yields programmatic and administrative efficiencies by leveraging existing residential-focused resources.

Implementation Challenges

Past evaluation, measurement, and verification studies have been limited to local government subprograms. GCP's approach could be better supported by evaluation data that focuses on schools and state agencies.

To align with CPUC direction and the other IOUs, PG&E discontinued its monitoring-based commissioning (MBCx) program, which was a major driver of savings for Institutional Partnerships. In support of providing a replacement program to institutional customers, PG&E is incorporating lessons learned from the MBCx program into the new Whole Building program, which is under development and will be designed to serve higher education and state government customers.

Institutional Partnership Subprograms

Institutional Partnerships, designed in partnership with the four IOUs, serve agencies of the state of California and state educational institutions. The objective of Institutional Partnerships is to reduce energy usage through facility and equipment improvements and share best practices among state institutions. There were four Institutional partnerships in 2017.

Through these Partnerships, IOUs and partners encourage strategies that promote investment in EE through comprehensive resource support and internal capacity-building. Although these existing Partnerships have made progress over the years, significant energy savings opportunities exist within state government and higher educational facilities. For example, with California's Executive Order B-18-12 requiring reductions in grid-based electricity purchases (20% by 2018) and aggressive Zero Net Energy (ZNE) goals (50% of all new and existing facilities by 2020 and 2025 respectively), the State is well positioned to make significant progress towards reducing energy usage and the overall carbon footprint of its facilities and infrastructure.

PG&E's Institutional Partnership portfolio focused on achieving energy savings and supporting Demand-Side Management (DSM) integration and coordination, which includes improving

Highlights of Institutional Partnerships 2017 Strategies and Successes

- The Proposition 39 Program completed 881 energy projects funded to date.
- The State of California Partnership completed projects in seven separate state agencies in 2017.
- PG&E's higher education programs completed 65 projects in 2017.



regulatory coordination, establishing integration procedures, and piloting DSM integration programs.

California Community Colleges (CCC)

The California Community Colleges/Investor-Owned Utility (CCC/IOU) Energy Efficiency Partnership advocates, promotes and supports EE in the California Community College system by leveraging resources from the Community College Districts, the Community College Chancellors Office, the four California IOUs, and the State of California. This unique Partnership results in achieving common goals for energy use reduction, cost savings, and fostering a more sustainable future.

The CCC/IOU Partnership provided extensive outreach and support services to the districts within the California Community College system in support of their efforts to identify, develop, and implement projects funded through Proposition 39.

2017 Strategies and Successes

The CCC/IOU Partnership's support of the California Clean Energy Jobs Act (Prop 39) program began in early-2013 and includes hands-on services from the four IOUs involved. Prop 39 was approved by California voters in 2012 and, among meeting objectives related to tax reform, will generate a projected \$550 million annually for appropriation by the Legislature for eligible projects to improve EE and expand clean energy generation in schools (K-12). These services include funding enhanced outreach, project development and technical support for 72 districts containing 112 campuses throughout California. Specific support tasks for Prop 39 include:

- Education about the CCC/IOU Partnership and Prop 39 program opportunities
- Identification of projects and development of a "Call for Projects Lists" for submission to the Chancellor's Office including rough order of magnitude of cost and savings estimates
- Creation of energy savings calculations which work for both IOU incentive programs and Prop 39 applications
- Technical verification of energy savings calculations through the IOU incentive applications processes
- Detailed creation of both IOU Incentive and Prop 39 applications and supporting calculations
- Coordination between CCC/IOU Partnership and Prop 39 program
- Support for project status tracking and reporting

Partnership support has enabled full Prop 39 program participation from all 72 districts, helping to ensure the success of this important statewide initiative. The program continued outreach efforts through participation in the CCC IOU Partnership Management team, and via PG&E participation in various workshops and conference presentations directed toward campus facilities staff.

In 2017, the program focused on meeting campus and IOU annual energy savings goals for 2017 project completion and achievement.

The program supported 10 Fellows as part of Strategic Energy Innovation's Bay Area Climate Corp program. These fellows were placed at campuses across PG&E territory to provide support for energy projects and other sustainability efforts.



University of California and California State Universities (UC/CSU)

The UC/CSU and IOU Energy Efficiency Partnership is a unique, statewide subprogram to achieve immediate and long-term energy savings and peak demand reduction within California's higher education system. In 2017, this partnership continued the permanent framework established in previous program cycles for sustainable, comprehensive energy management at campuses served by the IOUs.

The UC/CSU subprogram attributes its success in part to an engaged management team and executive team that meets regularly to discuss overall subprogram status and policy issues. The Partnership also has a Training and Education Team that organizes various EE trainings targeted to university campuses. In addition to representatives from each IOU, the University of California Office of the President and California State University Chancellor's Office each have members on all three program management teams. Inclusion of all Partnership stakeholders at the various management levels provides the UC and CSU campuses with support in their efforts to implement EE projects. The Program Administrator actively tracks project savings and schedule data in a web-based tracking tool and creates regular reports to show overall status of the subprogram and forecasts relative to goals.

Members of the management team also meet on a regular basis to document implementation progress, identify and resolve issues, and drive project completion. The Program Administrator actively tracks project savings and schedule data in an online tracking tool, and creates regular reports to show overall status of subprogram or forecasts relative to goals.

2017 Strategies and Successes

A major emphasis was placed on meeting campus and IOU annual energy savings goals in 2017 through, lighting and SBD projects which resulted in savings at 23 campuses across the Partnership.

The Partnership continued to actively engage the California State University Chancellor's Special Repairs funding initiative to help identify and fund new projects. Additionally, the Partnership continued to support training education and outreach efforts by holding various workshops for campus faculty and staff members.

State of California Partnership

The State of California Energy Efficiency Partnership Program shares best practices and implements EE projects for immediate and long-term energy savings and peak demand reduction at state-owned facilities served by the IOUs and other partners.

The partnership assists state agencies, under the Executive Branch of the state government, to comply with Executive Order S-20-04 (Green Building Initiative). The partnership also assists the Judicial Council of California (JCC), the administrative division of the Judicial Branch, to achieve their EE goals. These efforts help reduce the amount of energy the state purchases off the electrical grid. This statewide partnership provides enhanced custom incentives and core programs for projects implemented in California's state owned and leased buildings. Additionally, the IOUs provide services for education and training activities. An objective of the partnership is to integrate and coordinate various utility subprograms to leverage incentives and encourage customers to expand their focus beyond EE.

Partnership activities achieve cost-effective energy savings through EE, retro-commissioning, equipment retrofits, new construction, third-party programs, DR programs, and any applicable self-generation programs. The partnership also seeks opportunities to integrate utility incentives



with financing options. These include state financing through the GS \$mart program, the ARRA Revolving Loan Fund, or PG&E's On Bill Financing (OBF) subprogram to increase participation in the partnership effort and encourage additional energy projects.

2017 Strategies and Successes

The Partnership continued to use the Program Administrative Manager (PAM), a consulting firm that coordinates the subprogram statewide among the four IOUs and institutional customer groups first, acquired in 2016, to assist with subprogram implementation. The Partnership also participates in and provides education and training material at monthly Sustainable Building Working Group (SWBG) meetings. The SWBG is a collaborative effort between State of California agencies, focused on identifying and scaling sustainable practices, including EE. In addition, the partnership met frequently throughout the year. In addition to monthly management team meetings and quarterly executive team meetings, the Partnership instituted monthly project status meetings for both Executive Branch and JCC projects to ensure the Partnership deploys resources in a timely and effective manner.

California Department of Corrections and Rehabilitation

The California Department of Corrections and Rehabilitation (CDCR) / IOU Partnership is a customized statewide EE partnership subprogram that accomplishes immediate, long-term peak energy demand savings and establishes a permanent framework for sustainable, long-term comprehensive energy management programs at CDCR institutions served by California's four IOUs.

This subprogram capitalizes on the vast opportunities for efficiency improvements and utilized the resources and expertise of CDCR and IOU staff to ensure a successful and cost-effective subprogram that meets all Commission objectives. The subprogram also leverages the existing contractual relationship between CDCR and energy service companies (ESCOs) to develop and implement energy projects in CDCR facilities.

CDCR uses over half of the energy consumed by state agencies under the Governor's executive authority; however, CDCR's budget for implementing EE projects is minimal. With the CDCR/IOU EE Partnership, efficiency projects can be identified and implemented through the IOU core and On Bill Financing subprograms. On Bill Financing has been and remains to be the primary source of funding and, in select instances, is supplemented by either Special Repairs Project funding or the State of California Department of General Services Golden State Financial Marketplace Program ("GS \$Mart").

2017 Strategies and Successes

In 2017, CDCR started to reactivate retrofit projects that had been put on hold in 2016, performing Investment Grade Audits and scoping out projects. The IOUs and the PAM supported development of the new projects, ensuring that they reached maximum efficiency and incentive potential. To support more project development, the IOUs performed energy audits of a subset of CDCR's facilities, which CDCR is using to prioritize the next wave of projects.

The subprogram undertook an effort to ensure new construction projects and gas-savings water conservation projects were clearly tracked and proactively managed. The IOUs provided ongoing training to the ESCOs around changes to IOU financing options (i.e. enhanced incentives, rebates and OBF) and processes. Regular management team meetings (every four weeks) and executive team meetings (quarterly) have been key to identifying and managing projects, and to proactively addressing any challenges the subprogram may have faced.



Local Government Partnership Subprograms

PG&E's Local Government Partnership subprograms work with local governments to deliver energy services to city and county facilities and their communities. PG&E had 22 LGP in 2017 serving approximately 238 cities and 44 counties. These partnerships help meet the goals of the California Energy Efficiency Strategic Plan.¹⁷

Through LGPs, PG&E and local and regional partners work together to develop and implement subprograms that serve the public sector and the broader community, including SMB and non-profit customers. Over the past 10 years, PG&E's portfolio of LGPs has grown to cover most of PG&E's service territory

LGPs are the primary delivery channel supporting cities, counties, and other local agencies seeking energy savings and GHG emission reductions on the community-scale. Promoting energy planning at a statewide and local level is a major market driver in increasing the uptake of local government EE projects and extending the reach and effectiveness of PG&E's EE programs. Through LGPs, PG&E leverages the role of local governments to achieve deeper energy savings in both municipal facilities and the broader community as an integral part of other community climate action and sustainability programs.

PG&E LGPs are built around the communities which they serve. While local governments represent a majority of lead local partners, many LGPs are led by local economic development groups, associations of governments, joint power authorities, and regional non-profit organizations. These local organizations have missions aligned with supporting the economic, environmental and societal health of their communities. Local partners are best positioned to understand and identify customers within their communities and effectively partner with subprogram implementers to overcome barriers to EE adoption.

LGPs are designed to accomplish three broad goals:

1. Work with local governments to generate energy and demand savings within their own facilities and in their communities;
2. Take actions to support the California Energy Efficiency Strategic Plan objectives, and;
3. Provide DSM outreach and implementation of subprograms within the community

Over the past few years, Regional Direct Install subprograms have delivered the majority of SMB downstream energy savings for PG&E's EE portfolio. Through this offering, SMBs benefit from a high level of technical assistance and turnkey installation whereby the incentive payment is incorporated into the project proposal.

Proposition 39 has opened another channel through which many LGPs are serving K-12 public schools by tailoring municipal EE programs to better meet their needs. Many LGPs are also reaching moderate-income residential customers through targeted direct install programs, some of which support workforce development goals. These diverse segment approaches reflect how LGPs have matured into a reliable, integrated and innovative channel for PG&E's downstream, customer-facing EE portfolio.

¹⁷ California Public Utilities Commission. January 2011. *California Energy Efficiency Strategic Plan*. <http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5303>



LGPs also work to meet the targets of the California Energy Efficiency Strategic Plan by implementing EE strategies that support California's larger climate and GHG goals. Strategic Planning activities, also known as Strategic Energy Resources (SER), include energy and climate action planning, green building codes, and benchmarking policies and training. The Statewide Energy Efficiency Collaborative (SEEC) also operates under the SER Program.

Association of Monterey Bay Area Governments Energy Watch

The Association of Monterey Bay Area Governments (AMBAG) Energy Watch is a partnership between AMBAG and PG&E. AMBAG is a Council of Governments that is governed by a twenty-four member Board of Directors comprised of elected officials. AMBAG Energy Watch region includes the Santa Cruz, Monterey and San Benito Counties and the 18 incorporated cities. AMBAG Energy Watch serves PG&E's municipal, schools, special district, non-profit, agriculture and residential customers. Services include energy assessments and audits, Prop 39 support, technical assistance, assistance accessing low or no-interest financing, benchmarking assistance, and development of and assisting with implementation of regional energy action strategies.

Services provided by AMBAG include engineering services, a Regional Direct Install program through Ecology Action, and the MIDI Program. AMBAG Energy Watch also offers a robust public-sector program, providing both turnkey and customized EE solutions for municipal facilities and schools.

2017 Strategies and Successes

In 2017, the AMBAG Energy Watch subprogram continued to support school districts in the three counties in implementing EE projects funded by some combination of Prop 39 awards, PG&E incentives and OBF funding. The subprogram provided school districts with a turn-key EE solution that included one or more of the following services depending on the unique needs: development and specification of quantities and performance requirements for equipment upgrades, preparation and submittal of Energy Expenditure Plans to the State, administrative support related to PG&E program incentives and OBF funding, and communications support and technical assistance to district staff and leadership through to the completion of the project installation. This effort has been integral to making the AMBAG region a leader in school EE in the state. Out of about \$15M in Prop 39 funding awarded to the AMBAG region, 92% was a result of the AMBAG Energy Watch subprogram's assistance.

East Bay Energy Watch

East Bay Energy Watch (EBEW) is a partnership between PG&E, local governments, and energy service providers in the East Bay dedicated to providing the most cost-effective EE solutions for residents, businesses, and municipalities throughout Alameda and Contra Costa Counties. The EBEW partnership is guided by EBEW's Strategic Advisory Committee, consisting of local government staff spanning across the two counties, with a local government staff co-chair representing each county.

The Strategic Advisory Committee is coordinated by StopWaste. Programs provided by the EBEW include small and medium business direct install, no-cost residential direct install/workforce development, and municipal EE technical support. Program implementers include: DNVGL, Rising Sun Energy Center, and QuEST.



2017 Strategies and Successes

In 2017, EBEW continued to work with StopWaste and Contra Costa County administrators for the Strategic Advisory Committee. There are more than 20 local governments formally appointed to the Committee. Of important note is the significant growth in participation within Contra Costa County.

EBEW partners have experienced great success with the Civic Spark program that launched in 2015. The participation in this program grew in 2017 with the demand for the program to exceed the available resources. Through this program, local governments benefit from a full time or shared full time equivalent Fellow working on climate action issues in their communities. In combination with this capacity-building resource, EBEW continues to offer no-cost Building Operator Certifications (BOC) training (scholarships) for municipal employees, as well as no-cost participation in Lucid's Connected Cities program, leveraging interval data and dashboard technology to inform and educate both the public and civic employees on energy consumption and use patterns.

Fresno Energy Watch

Fresno Energy Watch (FEW) is a partnership that provides comprehensive EE services to the City of Fresno, County of Fresno, and the cities throughout the County of Fresno. The subprogram is managed by the City of Fresno Department of Sustainability and the Economic Development Corporation serving Fresno County.

The FEW delivers cost-effective, comprehensive, and persistent energy savings through the leadership of the local government. The goals of the partnership are to provide comprehensive and integrated energy solutions, address community needs, and capture available energy savings. Locally based EE seminars are offered to expand the audience for EE. The FEW also focuses on local energy policies that promote EE practices, codes, and standards.

Services provided by FEW include Home Energy Tune-Up, a Regional Direct Install program by Richard Heath & Associates, a third-party implementer, and the MIDI program. The Home Energy Tune-Up provides in-home energy assessments as a service to residential customers living in Fresno, Madera, Kings, Tulare, Merced, Stanislaus, San Joaquin, and Kern Counties. PG&E funded the subprogram when federal stimulus dollars ended in 2012.

The subprogram also provided benchmarking and limited audit services to qualified medium to large business customers through the Business Energy Tune Up program element.

Kern Energy Watch

Kern Energy Watch is a unique cooperative partnership between PG&E, SCE, SoCalGas, the County of Kern, and the partner cities within Kern County. The County of Kern serves as the partnership implementer and partners with the Kern Economic Development Corporation and other local agencies to provide support for outreach to small and medium sized businesses.

The Partnership provides assessments and the direct installation of energy saving measures by Staples Energy in qualifying residences, businesses, and municipal facilities throughout PG&E's service area in Kern County. The partnership also works to encourage the efficient use of energy by providing EE information at community events, by providing public and municipal education and training programs, and by providing audits and financial assistance to municipal customers for the energy-efficient retrofit of municipal facilities.



2017 Strategies and Successes

The Partnership is focused on assisting municipal customers with the benchmarking of their facilities, outreach to SMB customers, and partnering with local water agencies to promote the efficient use of both energy and water. There are also continued efforts to partner with County Supervisors to reach out to the small, rural, high poverty level communities to assist residents and businesses in utilizing the EE programs offered by PG&E and SoCalGas.

Madera Energy Watch

Madera Energy Watch (MEW) is a partnership that offers a range of EE options for commercial, small business and residential customers, as well as municipal facilities. The subprogram is implemented by the Madera County Economic Development Commission. MEW works with local contractors, builders, building departments, and others to install energy-efficient equipment to reduce energy use. Locally based training programs are offered to expand the audience for EE. MEW also focuses on local energy policies that promote EE practices and codes and standards. MEW delivers cost-effective, comprehensive and persistent energy savings among local MEW partners.

Services provided by MEW include the Third-party and Government Partnership Direct Install program. The program continued to offer the Home Energy Tune-Up as a service to residential customers living in Madera County (see Fresno Energy Watch section above).

Marin County Energy Watch

Marin County Energy Watch (MCEW) is a partnership between the County of Marin Community Development Agency and PG&E to deliver cost-effective and comprehensive energy savings and incentives to local governments, businesses, schools, residential, nonprofits, and special districts in Marin County. Services are delivered through three main subprogram elements. The Marin Energy Management Team provides energy management services and assessments tailored to suit the unique needs of public agencies, municipal facilities, and schools in Marin County. The SmartLights Program, implemented by Community Energy Services Corporation, provides start-to-finish technical assistance and energy assessments to nonresidential customers for lighting and refrigeration retrofits. MCEW also works with California Youth Energy Services to install hardware promoting EE, and delivers in-home energy assessments and education to residential owners and renters while providing green jobs for local youth.

In addition, MCEW assists cities and the county with climate action planning.

2017 Strategies and Successes

The subprogram provides customers, especially municipal customers, with long-term comprehensive EE planning and implementation services. MCEW ramped down this support in 2017 as Prop 39 funding was rolled back.

Mendocino-Lake Energy Watch

Mendocino-Lake Energy Watch (MLEW) is a partnership between the Community Development Commission of Mendocino County and PG&E. MLEW offers a comprehensive portfolio of EE programs that target residential customers, municipalities, small businesses, and nonprofits in both Mendocino and Lake Counties.

Using a locally-driven approach, MLEW offers innovative EE programs and outreach services in one of the more sparsely populated counties in the state. The commercial program elements



include a coordinated direct install program for lighting and refrigeration, education and outreach, and comprehensive energy audits for public facilities and small and medium businesses. MLEW also supports climate planning by providing municipalities with community-wide and municipal GHG emission inventories.

Services provided by MLEW include the Regional Direct Install Program via The Energy Alliance Association (TEAA), a third-party implementer.

2017 Strategies and Successes

MLEW continued to support ongoing energy benchmarking of local government facilities. The Partnership will continue to follow up with the facilities to encourage them to make EE retrofits.

Napa County Energy Watch

Napa County Energy Watch (NCEW) provides comprehensive EE services to municipalities, nonprofits, special districts and small and medium business customers. Sustainable Napa County serves as the local subprogram administrator. Services include audits, retrofits, outreach, and education. NCEW is uniquely positioned to influence energy conservation thanks to its deep roots and stellar reputation among municipalities, non-profits, and the vintner community. The partnership supports climate planning by taking the long-view, often including broader sustainability ventures across Napa County. Services provided by NCEW include the Regional Direct Install program by TEAA.

2017 Strategies and Successes

The subprogram works in close coordination with PG&E customer relationship managers, active Third-party subprograms, and local trade associations in the County of Napa to deliver comprehensive EE services to customers. In 2017, the Partnership coordinated with the third-party winery subprogram to better serve small wineries with the Regional Direct Install program.

North Valley Energy Watch

North Valley Energy Watch (NVEW) is managed by Northern Rural Communities Development, Inc. (NRCD). The NVEW develops, implements, and promotes commercial EE programs in Butte, Shasta, Glenn and Tehama counties to small and medium-sized businesses and promotes EE education to residents. In addition to the local governments, NVEW works with local workforce investment boards to leverage existing relationships with small to medium-sized businesses. NRCD's Direct Install Program is provided via Richard Heath Associates, a third-party implementer.

In 2017, NVEW continued to develop relationships with local agencies and further developed their relationships with the participating municipalities providing continued educational support, EE planning and implementation services.

2017 Strategies and Successes

NVEW created "Do-It Yourself" Energy Savings toolkits for residential and small commercial customers. The kits are available at libraries and can be checked out to help customers reduce their home or small businesses energy and water use. The kits include information on EE retrofit ideas and self-install products. The program also trains middle school STEM instructors on how to teach EE to middle school students using the DIY Toolkit.

NVEW continued to work with Work Force Investment Boards to market EE programs to the SMB market.



Northern San Joaquin Valley Energy Watch

In 2017, implementation of the Northern San Joaquin Valley partnership was managed by Valley Vision. In addition to performing GHG inventories and climate action plans for jurisdictions in the Central Valley, Valley Vision implemented the Energy Careers Experience Program that provides paid college student interns to PG&E offices throughout the Central Valley. These interns assisted customers with energy assessments, community outreach, and other EE resources. Efforts continued to engage local governments in the three counties served (Merced, Stanislaus, and San Joaquin)

Redwood Coast Energy Watch

Redwood Coast Energy Watch (RCEW) is a partnership between PG&E and Redwood Coast Energy Authority (RCEA). RCEA is a Joint Powers Authority whose members include the County of Humboldt; the Cities of Arcata, Blue Lake, Eureka, Ferndale, Fortuna, Rio Dell, and Trinidad; and, the Humboldt Bay Municipal Water District. RCEW achieves energy savings through a comprehensive, locally-driven approach in Humboldt County.

RCEW provides comprehensive energy management services and incentives through three main program elements. The Small Business Direct Install program offers hard-to-reach, small businesses with turnkey services as well as project management by a RCEA energy specialist. The Residential Program offers single-family homeowners no-cost energy assessments and installs a range of low-cost and no-cost measures while promoting PG&E's Residential Rebate Program. RCEA offers larger customers project management assistance with nonresidential retrofit projects. RCEA also offers climate and energy planning assistance to reduce community energy usage.

2017 Strategies and Successes

In 2017, the program delivered energy savings through its Small Business EE Program, a Residential Direct Install Program, a Non-Profit EE Program, and a Public Agency EE Program. The Redwood Coast Energy Authority's commercial and residential programs have been the catalyst for multiple EE, GHG reduction, and renewable energy development projects.

RCEW provided a Workforce Development pathway that encourages learning, development and advancement in California's EE industry.

San Francisco Energy Watch

San Francisco Energy Watch (SFEW) is a Partnership between the City and County of San Francisco and PG&E to deliver a broad spectrum of EE measures and savings for businesses as well as multifamily facilities in San Francisco. SFEW provides comprehensive energy management services and incentives through three main program elements. The Small Business Direct Install Program offers hard-to-reach, small businesses turnkey services, and complete project management by a program-assigned contractor. The Commercial Plus and Multi-Family Plus programs use a market-based, vendor-driven model to offer property owners and larger businesses technical assistance and energy assessments for installing a wide range of low-cost measures. SFEW also offers larger customers incentives for calculated, nonresidential retrofit projects.

SFEW also leverages Strategic Energy Resource funding for long-term EE planning and bringing innovative solutions to San Francisco customers. Services provided by SFEW include



the Local Government Partner Commercial Direct Install Program and the Local Government Partner Residential Direct Install.

2017 Strategies and Successes

The subprogram continued outreach to business organizations such as the Hotel Council, San Francisco District Merchant Association, SF Chamber of Commerce and Building Owners and Managers Association, Low Income Investment Fund, San Francisco Economic Development Alliance, and others to promote SFEW programs

SFEW completed or continued numerous campaigns in 2017 focused on the hospitality sector, SFOs, non-class A buildings, retail, and faith based organizations. They have assessed the metrics and lessons learned from these campaigns and are continuing their successful efforts in 2018.

SFEW also leveraged SER funding to address several areas, including addressing maintenance issues at SMBs in the food and beverage sector. Participants in this program on average reduced 14% of their refrigeration energy through training on preventive maintenance and other interventions. The SER funded microloan program continued to serve customers and provide copays for SFEW projects in 2017.

San Luis Obispo County Energy Watch

San Luis Obispo County Energy Watch is a partnership between PG&E, SoCalGas, the County of San Luis Obispo, the seven incorporated cities within San Luis Obispo County, and participating Community Service Districts (CSD). The County of San Luis Obispo serves as the partnership implementer, providing information and energy management and climate action planning service to municipal customers, and supporting EE services for other local residential and non-residential EE programs including a Regional Direct Install Program.

2017 Strategies and Successes

The Energy Watch program identified high potential projects at CSD facilities based upon the results of PG&E's Large Integrated Audit Program. The program developed energy benchmarking reports for seven cities with support from CivicSpark Fellows. Toward the end of 2016, these reports were used to educate city officials on EE strategies and available resources. In 2017, the Energy Watch program continued to assist these cities in developing and implementing EE retrofit projects at their facilities, leveraging partnership technical expertise, rebates, and on-bill financing programs. The Energy Watch program also updated the County's EnergyWise Plan (i.e., energy action plan).

San Mateo County Energy Watch

San Mateo County Energy Watch (SMCEW) is a partnership between the City/County Association of Governments of San Mateo County (C/CAG) and PG&E. SMCEW's goal is to reduce energy usage through EE in San Mateo County, including its twenty cities and unincorporated areas. C/CAG is a Joint Powers Authority consisting of all 20 cities and the County of San Mateo that enables direct contact to all levels of management at the city and county governments.

SMCEW delivers a comprehensive portfolio of EE services to public agencies, nonprofits, small businesses, schools, and residential customers including direct install programs for lighting and refrigeration measures, audits, benchmarking, technical assistance for more complex EE projects through PG&E's Customized Retrofit Program, as well as education and training programs.

Services provided by SMCEW include a Regional Direct Install Program (DI) and a Customized Engineering Program implemented by Ecology Action, and a MIDI Program implemented by EI Concilio. SMCEW staff partner closely with Ecology Action by identifying and driving EE retrofit opportunities, and by building a pool of qualified local contractors who can serve the DI program. The SMCEW is also developing a retrofit program targeting very small customers, which are difficult to serve cost-effectively through the DI program.

2017 Strategies and Successes

In 2017, SMCEW continued to serve local governments with EE retrofit projects. A three-part retrofit project at the City of Belmont using PG&E's Sustainable Solutions Turnkey (SST) program concluded its final phase. SMCEW also worked on projects targeting facilities at the County of San Mateo, Daly City, Millbrae, San Bruno, and San Carlos. SMCEW and implementer Ecology Action were approved to support SamTrans and Caltrain to address lighting efficiency at their stations, operations bases, and offices, and they began scoping a pilot project at the San Carlos station.

SMCEW continued to spearhead a ZNE pilot program by the California Public Utilities Commission (CPUC) for San Mateo County, which led to a working group of county departments and consultants to support the development and approval of Municipal Green Building Policy's for County facilities. The updated policy requires LEED Certification, a minimum number of points achieved in LEED energy and Atmosphere, and implementation of ZNE building approaches that are financially feasible. The policy was approved by the Board in December 2017 and language has been included in the RFP documents for new capital projects. SMCEW continued to work with multiple cities in development and adoption of CAPS. One CAP was completed and adopted by the City of Belmont. Additional cities that received CAP technical assistance included: Atherton, Burlingame, Millbrae, Pacifica, San Bruno and Unincorporated San Mateo County. The subprogram also began the process of launching a Resource Conservation Kit to be made available at libraries in San Mateo County. The Silicon Valley Energy Watch, which offers this in Santa Clara County, is collaborating on this effort.

Santa Barbara County Energy Watch

Santa Barbara County Energy Watch is a partnership between PG&E, SoCalGas, and the Santa Maria Valley Chamber of Commerce. The partnership covers only the northern portion of the County, which is the southern limit of PG&E's service territory, and serves the municipalities of Buellton, Solvang, Guadalupe, Santa Maria, and the County of Santa Barbara.

The partnership provides assessments and the direct installation of energy saving measures to qualifying residences, businesses, and municipal facilities throughout the northern Santa Barbara County service area. The partnership also works to encourage the efficient use of energy by providing EE information at community events, public and municipal education and training programs, as well as audits and financial assistance to qualifying customers for EE retrofits at their facilities.

2017 Strategies and Successes

In 2017, the Santa Barbara County Energy Watch completed EE retrofit projects for 60 small and medium-sized businesses and Municipal customers through the Regional Direct Install program. Additionally, the partnership reached out directly to residents, businesses and local governments through targeted outreach, including events and presentations conducted in the cities of Los Alamos, Santa Maria, Solvang, and Buellton.



The subprogram awarded \$5,000 in grants to non-profit agencies for EE projects. A grant was awarded to the Solvang Chamber of Commerce to conduct EE related outreach to the community's residents and businesses. This outreach campaign included a website, one on one contact with businesses, direct mailers, media advertising and radio interviews. An additional grant was provided to the City of Solvang to upgrade municipal buildings through the Direct Install program. The Energy Watch program also received energy related proclamations and resolutions from the Cities of Santa Maria, Buellton, Solvang, and the County of Santa Barbara, and will continue assist those local governments with EE resources and programs.

Sierra Nevada Energy Watch

Sierra Nevada Energy Watch (SNEW) is a partnership between PG&E and Sierra Business Council, a non-profit sustainability organization serving the Sierra Nevada region. The SNEW territory is comprised of 11 rural Sierra counties, including Lassen, Plumas, Sierra, Nevada, Placer, El Dorado, Amador, Calaveras, Alpine, Tuolumne, and Mariposa. SNEW is dedicated to providing innovative EE solutions for local governments and businesses throughout the Sierra. SNEW coordinates the strengths of PG&E and the counties and cities within the foothill region to overcome energy-efficiency barriers and better serve the unique needs of small mountain and rural communities.

SNEW provides comprehensive, sustained technical services to municipal, nonprofit, and small business customers. SNEW's Commercial Program includes the Energy Watch Tune-Up Program to help businesses save energy and money. This regional program provides a comprehensive energy assessment, delivers money-saving measures, and connects businesses with other energy saving opportunities. The Energy Watch Municipal Program offers assistance with benchmarking and energy assessments of government facilities and provides low-cost EE equipment, as well as climate and energy planning to reduce community energy usage.

Services provided by SNEW include the Small Commercial Direct Install Program and the Regional Direct Install Program implemented by Sierra Business Council.

2017 Strategies and Successes

SNEW continues to find success with the Water-Energy Nexus assessment and works with water agencies providing leak detection training. The partnership completed two sets of leak loss detection trainings.

The partnership brought Title 24 trainings to their local jurisdictions which are rural areas. This allows participants to attend classes in their local communities who would otherwise have to travel a far distance.

To date, SNEW has successfully engaged ten cities in Energy Action Planning activities to help reduce community energy usage.

Silicon Valley Energy Watch

The City of San Jose implements the Silicon Valley Energy Watch (SVEW) provides targeted EE education, outreach, energy savings delivery, and overall energy program coordination to 14 jurisdictions in Santa Clara County. SVEW collaborates with PG&E, other local stakeholders, and implementers to augment the success of regional programs through enhanced coordination and outreach, and ensure that targeted customers take advantage of EE audits, rebates and OBF financing, benchmarking reports, education and training offerings, and other resources and services.



Services provided by SVEW include a Regional Direct Install Program and a Customized Engineering Program implemented by Ecology Action and a MIDI Program implemented by Quality Conservation Services Inc.

2017 Strategies and Successes

In 2017, SVEW expanded its focus on supporting EE retrofits at schools, and submitted five Prop 39 energy expenditure plans for local educational agencies (LEAs) in the county. SVEW worked with CommUniverCity San Jose's Green Ninja team to expand their Do-It-Yourself (DIY) Home Energy Saving Toolkit program into middle schools, reaching 565 students and their families. The toolkit box is stocked with energy and water measures, measuring devices, and step-by-step instructions to empower the user to understand their energy and water resource consumption patterns, and inform them how to become more efficient. SVEW's primary non-resource activity in 2017 was the Energy Innovation and Climate Action Planning Grant program, which provides local governments with the resources to conduct climate action planning activities and/or provide other non-resource energy-efficiency programs to Santa Clara County PG&E customers. In 2017, proposals were solicited and grants were awarded to Sunnyvale and Morgan Hill. Contracts were negotiated and executed in June/July 2017. Sunnyvale's grant supported a community engagement plan to support residents in home energy monitoring and analysis. Sunnyvale enrolled 17 active participants. Morgan Hill's grant supported installment of energy management systems at City Buildings. Three buildings were selected and contracts for both virtual energy management systems and enhanced commissioning projects have been established.

In early 2017, the City of San Jose embarked on the development of an Environmental Sustainability Plan/Climate Action Plan ("ESP"). The ESP will focus on three primary areas: energy, transportation, and water.

The City of San Jose identifies EE as a high-priority for its ESP given that a large portion of its GHG emissions come from energy usage. Through the development of the ESP, the City will broadly communicate the benefits of and opportunities for EE in its homes, businesses, and schools. Although the City's ESP has a focus that is broader than just EE, the SVEW contract will support only those activities related to EE, the water-energy nexus, or other non-resource issues specified in PG&E's SER Guidance Document.

Solano Energy Watch

Solano Energy Watch (SEW) provides comprehensive EE services to municipalities, nonprofits, special districts, SMBs, and residential customers. The partnership is led by the three Solano Economic Development Corporation and the County of Solano. Each partner specializes in different target markets and brings their local expertise to serve the community. Services include audits, retrofits and outreach. The partnership launched in 2014 and has showed great strength in outreach to Solano County residents, SMB customers, and municipalities.

Services provided by SEW include the Regional Direct Install Program by TEAA, a third-party implementer, and residential direct install with the California Youth Energy Services Program by Rising Sun Energy Center.

2017 Strategies and Successes

Solano EDC promotes EE through the perspective of economic development and strengthening economic viability. By reducing energy costs through EE, those dollars can be reinvested back



into businesses. Solano EDC actively engages with SMB customers via direct outreach in coordination with TEAA, the direct install implementer. Last year, of all the SMB customers touched by the Partnership, most of the customers agreed to complete an EE retrofit.

Sonoma County Energy Watch

Sonoma County Energy Watch (SCEW) offers a comprehensive portfolio of EE programs that target municipalities, nonprofits, small and medium businesses, and residential customers. The local administrator, County of Sonoma Department of General Services, aims to lead by example and is working in partnership with other cities in the county to promote programs and initiatives in energy conservation and efficiency, clean energy generation, and environmental programs.

Services provided by SCEW include the Regional Direct Install Program implemented by TEAA and a residential direct install and education program that employs youth energy specialists administered by Rising Sun Energy Center.

2017 Strategies and Successes

In 2017 the Sonoma Energy Watch worked closely with PG&E BES reps to identify projects within their own county facilities, in hopes that these will serve as a pilot for future work at county facilities. After the wildfires in 2017, the county is focusing resources to helping victims rebuild by connecting them to PG&E services, sponsoring workshops, and dedicating staff time to community outreach and support.

Sutter Buttes Energy Watch

Sutter Buttes Energy Watch (SBEW) is a partnership that includes Colusa, Sutter and Yuba Counties. The goal of this partnership is to promote EE and the reduction of GHG emissions in local government operations. SBEW concentrates on government facilities, nonprofit organizations, small businesses, residences, farms, schools and factories promoting energy-efficient programs. SBEW provides a direct-install program that provides energy-efficient measures to municipal facilities, non-profit businesses, special districts and hard-to-reach SMBs. In addition to the direct install program, the SBEW brings EE training and workshops and a tool lending library.

2017 Strategies and Successes

SBEW continues to focus on promoting and developing new relationships within the counties, while promoting PG&E EE programs.

Valley Innovative Energy Watch

Valley Innovative Energy Watch (VIEW) is a unique cooperative partnership between PG&E, SCE, SoCalGas, the County of Kings, the County of Tulare and the partner cities within these counties. The San Joaquin Valley Clean Energy Organization serves as the partnership implementer.

The Partnership provides assessments and the direct installation of energy saving measures in qualifying residences and businesses and benchmarking, audits and project management assistance for city and county facilities located in the PG&E service area. The partnership also works to encourage the efficient use of energy by providing EE information at community events, by providing public and municipal education and training programs, and by providing financial assistance to municipal customers for the energy-efficient retrofit of municipal facilities.



2017 Strategies and Successes

In 2017, the VIEW Partnership continued its efforts to assist the Partnerships throughout the San Joaquin Valley with benchmarking and EE project development for municipalities. The Partnership also continued its efforts to partner with County Supervisors to reach out to the small, rural, high poverty level communities to assist the residents and businesses in utilizing the EE programs offered by PG&E, SCE and SoCalGas.

Yolo Energy Watch

Yolo Energy Watch (YEW) promotes EE and the reduction of GHG emissions in local government operations. In addition, YEW promotes the reduction of GHG emissions throughout the community not only through programs targeting government facilities, but also nonprofit organizations, small businesses, residences, farms, schools and factories in Yolo County. YEW provides a direct-install program that provides energy-efficient measures to municipal facilities, non-profit businesses, special districts and hard-to-reach SMBs. In addition to the direct install program, the YEW brings EE training and workshops to the residents making the classes easier to attend.

Services provided by YEW include the Regional Direct Install program implemented by Richard Heath Associates.

2017 Strategies and Successes

Yolo Energy Watch continues to work with local governments to educate and support small businesses with energy-efficient measures and education.

YEW participates in several community programs such as The Davis Natural Resources Commission, Valley Climate Energy Alliance and the Valley Climate Action Center as well as working with several municipal entities on their Energy Action Plans.

California Green Business Program

PG&E supports the EE-related implementation of the California Green Business Program (GBP) by partnering with the California Green Business Network. GBP is a state-recognized program to guide SMBs toward more sustainable operations including solid waste, pollution prevention, EE, and water conservation. A network of GBPs run at the city and county level across the State has joined forces to share resources and they are collectively called the California Green Business Network. In 2017, PG&E dispersed funding to 10 local GBPs and acted as the administrator of a statewide database essential to the function of all GBPs statewide. This funding has allowed for the use of student interns from various Green Jobs training programs to conduct energy audits and provide technical assistance to SMBs.

2017 Strategies and Successes

The California Green Business Network has been working in collaboration with PG&E to direct green business leads to PG&E's SMB team through their upgraded database. The SMB team will connect these customers to PG&E services and programs that will aid in their Green Business Certification. GBPs were launched in two new areas in the Central Valley: San Joaquin County and Fresno County. Furthermore, PG&E assisted the network by supporting the development of co-branded marketing collateral for distribution to businesses by the GBPs and PG&E alike.



Statewide Energy Efficiency Collaborative

The Statewide Energy Efficiency Collaborative (SEEC) engages three statewide non-profit organizations and California's four IOUs. SEEC provides education and tools for climate action planning, venues for peer-to-peer networking, technical assistance and recognition for local agencies that reduce GHG emissions and energy use. SEEC partners include the Local Government Commission, the Institute for Local Government, and ICLEI – Local Governments for Sustainability, as well as the Statewide Local Government Energy Efficiency Best Practices Coordinator (the Coordinator). PG&E acts as lead coordinator for ICLEI's involvement in SEEC.

2017 Strategies and Successes

At the annual SEEC Forum, there were over 300 participants representing 90 unique cities, counties, and regional agencies.

The SEEC ClearPath tool is a suite of online resources to help local agencies complete government operations and community-wide GHG inventories, forecasts and climate action plans. ClearPath remains effective in helping communities build their climate action plans. Between that and ICLEI's staff, 15 cities created new emissions inventories.

Third-party Programs

Third-party subprograms are often more locally-focused than the IOUs' statewide programs and serve niche markets. Third parties are responsible for the program implementation, including project design, technical assistance, outreach and marketing, implementation, job processing, quality assurance and control, and in some cases, incentive payments. Third-party subprograms are often designed to either implement new and innovative ideas or meet local needs and produce cost-effective energy savings that meet or exceed savings goals.

PG&E's Third-party Program Objectives

PG&E's overarching objectives of third-party subprograms are to:

- Provide targeted solutions for customers
- Engage "niche" customers groups with tailored delivery strategies
- Serve as sales channel partners to help educate customers about other program offerings and drive comprehensiveness to maximize customer interaction



Residential Third-party Program

PG&E's Residential Third-party Programs are an integral component of its overall Residential sector strategy to help provide customers with energy-efficient solutions and services.

Energy Fitness & Moderate Income Direct Install Subprograms

Implementer: *Richard Heath Associates (RHA)*

The Residential Energy Fitness Program (REFP) was selected through an innovative solicitation conducted in 2015. Key components include enhanced methods to target customers and deliver customer education. This direct install subprogram includes energy education, in-home assessment, installation of no cost and low-cost measures, and ongoing education to monitor energy usage after participating in the subprogram. The subprogram was launched in June 2016 and assisted targeted customers with EE upgrades, and improving existing heating and air conditioner efficiency through duct sealing, efficient motors and fan controls, and refrigerant charge adjustment, among others.

In September 2017, the Moderate Income Direct Install (MIDI) program which was also administered by RHA was significantly expanded and added to the REFP subprogram. In the 2017 MIDI relaunch, the offering was expanded to serve moderate-income residents up to 400% of the Federal Income Guidelines across the PG&E territory, with an increased range of no cost measures. Measures include Tier II Smart Power Strips, LED lighting, low flow showerheads and faucet aerators, and products and services to increase the efficiency of air conditioner units. Ongoing customer education and reporting is also offered through the subprogram utilizing a similar monitoring service as REFP above. The expanded service to all moderate-income single and multifamily renters and owners across PG&E service territory reduces customer income qualification to self-certification only.

In 2017, both REFP and MIDI began evaluating the ability to offer smart thermostats at no cost to participating customers and anticipate incorporating this measure in 2018. The new measure would provide customers a more healthy, efficient, and comfortable home.

California New Homes Multifamily Subprogram

Implementer: *TRC*

The California New Homes Multifamily subprogram provides comprehensive support for saving energy in the Residential new construction sector with a cross-cutting focus on sustainable design and construction, green building practices, EE, and ET. Through a combination of education, design assistance, and financial support, the California New Homes Multifamily subprogram encourages building and related industries to exceed California's Title 24 standards and prepare builders for future changes to these standards.

Enhanced Time Delay Relay Subprogram

Implementer: *Proctor Engineering*

The Enhanced Time Delay Relay subprogram (also known as the Cooling Optimizer subprogram) is a direct install subprogram serving multifamily residential customers in targeted climate zones. The subprogram shifted exclusively to multifamily customers in 2016 to increase penetration in this hard-to-reach segment, and was designed to address the unique EE challenges presented in property management-owned and tenant-occupied buildings. The multifamily subprogram offers property managers a no cost tune-up, fan delay relay installation, high-efficiency BPM fan motor installation, as well as incentives for establishing a maintenance contract. This focus on maintaining a properly tuned air conditioner can improve tenant comfort

and reduce their energy bills. In partnership with Enovative Group, Inc., the subprogram also offers an on-demand recirculation pump control for multifamily buildings with central water heating. Demand based controls can reduce recirculation pump run time and provides equipment life and maintenance benefits. In 2018, the smart thermostat has been added as a new offering in the subprogram to help customers better manage heating and cooling energy use and the upcoming residential Time-of-Use transition.

Direct Install for Manufactured and Mobile Homes Subprogram

Implementer: Synergy Companies

The Direct Install for Manufactured and Mobile Homes subprogram is a direct installation, no-cost-to-the-customer subprogram that serves the hard-to-reach residents of manufactured homes and mobile home parks. It also targets a variety of non-English speaking customers. The subprogram improves the efficiency of air conditioners by providing air conditioning tune-up and refrigerant charge adjustment, fan controls to save energy by running the fan at the end of the compressor cycle, and high-efficiency blower motor upgrades. The subprogram also offers installation of Tier II Smart Power Strips and ENERGY STAR® rated products including lighting, low flow showerheads, and aerators.



PG&E's Direct Install for Manufactured and Mobile Homes offers hard-to-reach customers low-cost options to save energy and lower their energy bills.



Commercial Third-party Program

Commercial third-party subprograms offer a turnkey approach that continues to deliver savings, serve customer needs, and remain innovative by adapting to changing market needs. PG&E offers a variety of Commercial third-party subprograms that span various market segments, targeting many of PG&E's harder-to-reach customers.

Energy Smart Grocer Subprogram

Implementer: CLEAResult

The Energy Smart Grocer subprogram provides comprehensive EE services for medium to large grocery stores and supermarkets in the PG&E service territory. The subprogram provides comprehensive energy audits, long-term energy planning, and support for the implementation of efficiency measures.

2017 Strategies and Successes

The subprogram has successfully partnered with PG&E account representatives to leverage PG&E's OBF Program to implement large-scale and complex retrofit projects delivering deeper savings.

Retail Energy Efficiency Subprogram (REEP)

Implementer: Matrix Energy Services, Inc.

The Retail Energy Efficiency subprogram provides retail chain stores with lighting and HVAC upgrades designed specifically for their commercial spaces. It was designed as a quick turnaround direct install subprogram specifically targeting corporate chains with 10 or more stores within PG&E's service territory. The Matrix subprogram staff conducts energy audits at the customer's facility and recommends EE upgrades. Matrix's team of skilled installers then performs the agreed-upon equipment retrofits. The subprogram did not have any signed customer commitments or new projects in the pipeline as of mid-2017, so PG&E filed to close the subprogram.¹⁸ PG&E anticipates issuing a solicitation upon Business Plan approval for a new third-party designed and implementing subprogram that will serve the retail segment.

LED Accelerator (LEDA) Subprogram

Implementer: Energy Solutions

LED Accelerator encourages large commercial retail customers to install best-in-class LEDs with the goal of increasing the quality of LEDs offered to the broader market over time. The subprogram offers three tiers of equipment specifications and incentives, helping create a market for manufacturers' best-in-class products and enabling customers to overcome cost barriers associated with more expensive offerings. As sales volumes of the best-in-class products increase, the associated product costs decrease, and products with higher efficacy and better light quality become readily available to the general market.

2017 Strategies and Successes

LEDA provided technical services including audits, LED product selection, pilot demonstration, economic analysis for decision making, financing assistance, monitoring, and application support. Specific strategies for successful projects included:

- Informing customers about innovative LEDs and encouraging the installation of higher quality EE products than originally specified.

¹⁸ PG&E's 2018 Energy Efficiency Annual Budget Advice Letter, Advice Letter 3881-G/5137-E



- Establishing compelling proposals, including financial incentives and project financials, for decision makers to move forward on projects.
- Conducting post-audits to ensure more accurate energy results and implementing a robust quality assistance and quality control subprogram.

Hospitality Subprogram

Implementer: Ecology Action

PG&E's Hospitality subprogram offers a comprehensive list of EE measures and services specifically designed to meet the complex needs of the hospitality market. The Hospitality subprogram offers both custom and deemed measures, and assists customers with EE projects from start to finish.

2017 Strategies and Successes

The Hospitality subprogram developed strong working relationships in 2017 with lodging customers and chain customers in particular. In addition, the subprogram targeted full-service restaurants for a larger roll-out in 2017 based on earlier successes. Existing relationships allowed the subprogram to work with these customers continuously over time on multiple projects, and identify and work with the decision makers of chain customers, which is frequently a considerable barrier to participation. This helped support the coordination and implementation of projects across hotels of the same chain. In total, the subprogram completed over 400 projects in 2017.

K-12 Private Schools and Colleges Audit and Retrofit Subprogram

Implementer: Matrix Energy Services, Inc.

The K-12 Private Schools and Colleges Audit and Retrofit subprogram provides comprehensive EE services to private preschools, K-12 schools, colleges, universities, and trade/technical schools. The subprogram works with customers to identify both deemed and custom EE measures. It also provides technical and project implementation assistance to ensure qualified measures are installed.

The subprogram did not have any signed customer commitments or new projects in the pipeline as of mid-2017, so PG&E filed to close the subprogram¹⁹. PG&E will continue serving private schools customers through other subprograms in 2018, including Regional Direct Install and Local Government Partnerships.

Healthcare Energy Efficiency Subprogram

Implementer: Willdan

The Healthcare Energy Efficiency Program (HEEP) provides hospital facilities (medical office buildings and acute care facilities) a wide range of support services to address barriers to EE. HEEP delivers electric and gas savings through retrofits (deemed and calculated) and RCx services. The Healthcare Energy Efficiency subprogram had success in HVAC custom measures and deemed lighting measures and paid 6 projects. The HEEP subprogram will continue to target large healthcare facilities and Willdan will leverage experience with OSHPOD requirements to deliver customers with targeted value propositions.

Commercial Industrial Boiler Efficiency Subprogram

Implementer: Enovity

¹⁹ PG&E's 2018 Energy Efficiency Annual Budget Advice Letter, Advice Letter 3881-G/5137-E



The Commercial Industrial Boiler Efficiency Program provided a turnkey rebate offering with no-cost technical services and rebates to identify and implement boiler and steam system efficiency projects.

PG&E filed to close the subprogram in 2016.²⁰ The subprogram was closed mid-2017 after completing the existing pipeline.

Data Center Air Flow and Temperature Optimization Subprogram (IDEEA 365)

Implementer: CLEAResult

The Data Center Air Flow and Temperature Optimization subprogram provided comprehensive EE offerings targeted to small and medium-size data centers embedded within customer buildings. The subprogram worked with customers to conduct preliminary screening calls and in-depth assessments that help customers identify energy saving best practices and develop specific plans of action to implement EE improvements.

PG&E filed to close the subprogram²¹ following continued difficulties in converting pipeline and delivering projects. This was also a strategic decision to make room for the future of PG&E's EE portfolio and the inclusion of new third-party designed and implemented subprograms.

Energize Schools Subprogram (IDEEA 365)

Implementer: Strategic Energy Innovations

Energize Schools is a non-resource subprogram to assist K-12 schools in planning for and implementing Prop 39 energy projects while educating students and teachers in energy conservation and efficiency.

2017 Strategies and Successes

In 2017, SEI Energize focused on assisting Tier 1 and Tier 2 schools in receiving Prop 39 funds and in submitting 11 Energy Expenditure Plans by providing technical services including benchmarking and audits for 19 schools.

Energize Schools held energy conservation competitions in the spring and fall of 2017 with 67 schools throughout PG&E service territory. Energize Schools held energy conservation competitions in the spring and fall 2017 with 67 schools throughout PG&E service territory. Students learned about energy conservation and conserved over 150,000 kWh throughout the two competitions. SEI also provided teachers with over 130 curriculum products to continue energy and sustainability education after the competitions.

School Energy Efficiency Subprogram

Implementer: CLEAResult

The School Energy Efficiency (SEE) subprogram helps K-12 public schools and their contractors identify, evaluate, and implement EE retrofit measures through technical analysis, measure prioritization, and engineering support.

²⁰ Fourth Supplemental: PG&E's 2017 Energy Efficiency Annual Budget Advice Letter, Advice 3753-G-D/4901-E-D

²¹ Fourth Supplemental: PG&E's 2017 Energy Efficiency Annual Budget Advice Letter, Advice 3753-G-D/4901-E-D



2017 Strategies and Successes

The SEE subprogram is structured as a no-cost technical assistance and support subprogram to identify projects and see them through by working alongside the customer. This structure enables the SEE subprogram to work with the school district without triggering the unique construction, bidding, and wage requirements of California public school districts. In 2017, SEE had particular success assisting schools with HVAC advanced economizers and pool retrofits.



Industrial and Agricultural Third-party Programs

The third-party subprogram delivery channel is important for the Industrial and Agricultural sectors. The Industrial and Agricultural third-party programs offer a turnkey approach that continues to deliver savings, serve customer needs as well as stay innovative by adapting to changing market needs.

Industrial Third-party Program

California Wastewater Process Optimization Subprogram (CalPOP)

Implementer: QuEST

CalPOP targets wastewater treatment plants and provides facility audits, engineering assistance, project management support and financial incentives based on potential energy savings. The subprogram helps wastewater treatment facilities optimize their processes to reduce energy usage. CalPOP identifies energy savings opportunities related to surface aeration processes (delivered DO sensors, controls, and training) as well as the optimization of all treatment type equipment and process eligible for IOU incentives.

CalPOP's first subprogram iteration in 2000 focused on wastewater treatment facilities as major energy consumers. Initially it focused on surface aeration optimization -- delivering Dissolved Oxygen sensors, controls, and training. This broadened to include all treatment types and equipment optimization and retrofit.

2017 Strategies and Successes

In 2017, the subprogram focused on incorporating Standard Practices in its subprogram design and outreach approach. Moving forward, CalPOP looks to continue to improve customer technical support, engagement with the municipal approval process for the various water agencies, and implementation project management.

Energy Efficiency Services for Oil and Gas Production

Implementer: CLEAResult

Energy Efficiency Services for Oil and Gas Production is a turnkey custom measure incentive subprogram designed to deliver reliable and persistent electric savings by educating and assisting oil and gas producers and pipeline operators to take advantage of the latest technologies and processes to improve their operations to save energy and improve efficiency.

2017 Strategies and Successes

This subprogram has been ongoing since 2006 and targets oil and gas producers of all types, providing focused assessments, calculation and documentation support, and financial incentives based on actual energy use reductions. It has convinced a risk-adverse customer base to adopt changes through education and persistent follow through with customers to implement projects.

The subprogram leveraged a promotional subprogram brochure that served to inform customers of qualifying projects and EE measures, participation process, and incentive amounts to reach out, introduce, stimulate and recruit eligible oil and gas producers to participate. The subprogram also utilized PG&E Account Managers, Trade Allies (equipment vendors), and industry information to create customer contact lists, and participated in industry associations and other forums to reach out to qualifying customers.

The oil industry, with its history of booms and busts, is currently in one of its deepest downturn since the 1990s. Earnings are down for companies that made significant profits in recent years,

leading them to suspend drilling operations, sharply cut investment in exploration and production, and reduce non-essential operating budgets. The subprogram will continue to push for adoption of new technologies (e.g. MotorWise™), adjust marketing efforts to focus the communicated benefits of the subprogram on avoided energy costs rather than on available technology, and identify ways to expedite project commitment approvals so customers can act quickly once a qualified project has been identified.

Heavy Industry Energy Efficiency Subprogram

Implementer: Lockheed Martin Corporation

The Heavy Industry Energy Efficiency Program (HIEEP) identifies and facilitates the implementation of major process-oriented and other EE upgrades for large industrial manufacturing customers and recently added Food Processing facilities in the Central Valley.

2017 Strategies and Successes

The Lockheed Martin Energy (LME) HIEEP subprogram and PG&E have worked collaboratively for years to enhance and streamline process and subprogram flow. Through close collaboration HIEEP, in conjunction with PG&E, have enhanced customer service throughout the PG&E service territory by strategically placing field offices closer to the customer. The opening of the Bakersfield, CA office has resulted in greatly improved timeliness and responsiveness to PG&E's Central Valley customers while at the same time allowing increased collaboration on a variety of EE projects with both PG&E and the end use customers. In 2017, HIEEP gained momentum with Central Valley Food Processors and will continue to explore new opportunities for all segments they engage with.

Industrial Refrigeration Performance Plus Subprogram (IRPP)

Implementer: VaCom Technologies

IRPP targets refrigerated warehouses, food processors, and related cooling operations that operate year-round or seasonally in the food and beverage sector, including processing, storage and distribution operations with industrial refrigeration systems. Under IRPP, existing facilities are retrofitted, emphasizing refrigeration system improvements as well as envelope, pumping, air handling, and related process equipment. Whole-facility simulation is used to quantify savings and economics. Two years of web-based automated performance monitoring and associated operator education is included to provide transparency and permanence of savings. IRPP provides more complex, comprehensive integrated solutions, higher savings levels and institutes a continuous improvement paradigm delivered through real-time performance monitoring and advisory services.

2017 Strategies and Successes

2017 was a challenging year for IRPP. The subprogram was unable to successfully finalize a project for payment and the subprogram will start a transition plan in 2018 to ramp down activities.

Industrial Retrocommissioning Subprogram

Implementer: Nexant, Inc.

The Industrial Retrocommissioning Program (IRCx) targets the heavy industry, manufacturing, bio-tech, high tech, and food processing sectors and generates energy savings by helping PG&E customers optimize their manufacturing processes and process cooling systems by systematically studying low-profile energy losses that commonly occur in these facilities.



2017 Strategies and Successes

Because of the unique nature of each facility, the IRCx Program facilitates the delivery of audits, and if needed, implementation, by subject matter experts in these types of specific disciplines. The subprogram's consultants and service providers allow the subprogram to provide industries with the most comprehensive energy solutions available from their utility.

Instead of focusing on a small part of the equipment, the IRCx subprogram optimizes whole system operations, achieving deep energy savings for the customer. For example, this includes enhancing the control systems to allow the customer a more transparent operation of their system, so that they can monitor the system and maintain the energy savings level in the future.

The IRCx Program is the first of its kind in PG&E's service territory. It serves the industrial manufacturing sector and commercial processing facilities with built-in requirements designed to promote savings persistence. For some implemented measures, the maintenance plan can consist of a computerized maintenance management system, multi-year contract with a preventive maintenance contractor (typically three years), or purchasing equipment to review the operation of the system and training personnel on how to use this equipment.

In 2017, the IRCx subprogram began developing projects with biotech and hi-tech customers focusing on their process cooling systems. These are new type of projects for the subprogram with exciting energy saving potential for these customers which have been underserved in the past.

Industrial Compressed Air System Efficiency Subprogram (ICASE)

Implementer: AALD

The ICASE subprogram was selected as an innovative subprogram for IDEEA 365 solicitation process. The subprogram targets industrial customers with large (>100 hp) compressed air and vacuum systems, and promotes and installs a state-of-the art control and data monitoring system called iZ. Compressed air and vacuum systems are dynamic systems that are constantly changing and deteriorate very quickly when not closely monitored. iZ automation system delivers support and assists customers with keeping efficiencies that have been initially gained by implementing an EE project.

2017 Strategies and Successes

The subprogram developed outreach processes to provide extensive education to local account representatives and engineering staff about advantages, features, and capabilities of the new iZ control system. In parallel subprogram staff conducted comprehensive market research to justify acceptance of the proposed control systems over others existing on the market. ICASE concentrated on targeting compressed systems based on centrifugal compressors as higher EE potential.

Refinery Energy Efficiency Subprogram (REEP)

Implementer: Nexant

REEP educates key stakeholders on energy-efficient practices in refineries and assists our largest refinery customers in developing and implementing EE projects in PG&E's territory. Nexant brings specialized expertise in refinery engineering and construction to analyze EE options available to our highly sophisticated customers.



2017 Strategies and Successes

Seeing the gradual decline in performance year over year, along with PG&E's strong relationship with these large customers, PG&E filed to close the REEP subprogram.²² This decision will enable PG&E to refine targeting strategies and guide market participants through a design that will ensure cost-effective, reliable energy savings in the future.

A transition plan has been instituted to facilitate the completion of existing projects in Nexant's pipeline and aid the transition of project development to PG&E's field engineering staff.

Small Petrochemical Energy Efficiency Subprogram (SPEEP)

Implementer: CB&I (Now called APTIM)

CB&I's SPEEP subprogram was selected in 2016 through an IDEEA 365 solicitation, designed to deliver turnkey EE services to underserved and hard-to-reach customers in PG&E's refinery and petrochemical markets. The subprogram targets smaller refineries in the southern portion of the PG&E service territory, and smaller and medium sized petrochemical customers throughout PG&E territory. The subprogram offers custom and deemed retrofit, as well as industrial retrocommissioning project services, and utilizes SEM planning approaches and tools to develop and implement strategies and projects.

2017 Strategies and Successes

Since launching in 2016, SPEEP has conducted market outreach to targeted customers, has completed one SEM plan and is in the process of developing others, and has initiated development of various gas and electric projects with three companies. CB&I completed the first subprogram project by year end, which was a large gas-saving project.

Because SPEEP targets smaller and mid-sized customers, the subprogram is working closely with the Mid-Market account team to target customers and develop a marketing and outreach campaign. Also, the subprogram is raising customer awareness of certain sunseting measures as a way to create a sense of urgency and initiate subprogram services and SEMP assessments.

High priority project opportunities include steam trap replacement, lighting replacement (interior/exterior), pump VSD control, cooling tower VSD control, high-efficiency motor, compressor VSD, and insulation upgrade, among others.

Water Infrastructure System Efficiency Subprogram

Implementer: Lincus

The Water Infrastructure System Efficiency (WISE) subprogram focuses on the energy optimization of water and wastewater systems in California. The subprogram targets comprehensive system optimization by targeting component improvements first and then optimizing the system as a whole through measures such as pump sequencing and system optimization through hydraulic modeling.

2017 Strategies and Successes

Launched in February 2014, the WISE Program has continued to develop water system benchmarks, project prioritization lists, and energy audits to demonstrate cost-effective EE

²² Fourth Supplemental: PG&E's 2017 Energy Efficiency Annual Budget Advice Letter, Advice 3753-G-D/4901-E-D

opportunities with customers. In addition, the WISE subprogram has evaluated energy intensities of various water system components and the embedded energy in customer water and wastewater systems through Water Energy Nexus reports. The subprogram targeted system optimization projects aimed at long-term EE improvements.

Customers who enrolled in the subprogram and implemented their first projects in 2016 continued working with WISE identifying new opportunities in all aspects of EE implementation.

Most water and wastewater customers show tremendous opportunities to reduce the energy consumption of their systems. Although customers operate effective, reliable and safe water systems, little emphasis is put on EE of their systems. Through the technical support and incentives provided through the WISE subprogram, enrolled customers are identifying cost-effective opportunities to meet their customer demands while reducing energy use. Furthermore, depending on the embedded energy of their system, water conservation measures may yield significant energy savings as well. Since WISE has been extended, the subprogram will continue to work with new and existing customers to develop long-term system transformation projects that will include pump efficiency improvement projects, pump sequencing optimization, water system optimization using hydraulic models, among other comprehensive EE measures.

Food Processing Subprogram

Implementer: *CLEAResult*

The Food Processing Program is a comprehensive subprogram designed to assist food processing customers to identify plant-wide electric and gas energy savings opportunities by providing technical assistance to quantify energy savings and help with the application process to provide cash incentives that encourage implementation of EE projects.

A primary subprogram challenge has been the barrier to entry for customers pursuing calculated projects. The length of the pre-approval cycle has increased significantly to a level where it is discouraging participation and installation of EE projects.

2017 Strategies and Successes

CLEAResult's comprehensive subprogram approach encourages deep savings and long-term engagement from many customers, as food processors have diverse operations with multiple opportunities for EE measures.

In 2017, the subprogram focused on marketing through direct outreach to customers, working closely with PG&E account representatives, and educating equipment vendors about eligible measures as applied to their equipment and services. The subprogram also utilized industry associations and other forums such as the California League of Food Processors (CLFP) to reach out to qualifying customers.

In 2018, PG&E will start transitioning a portion of its Food Processing engagement from the Agricultural portfolio to the Industrial SEM program. This will better align with the objectives set in PG&E's Business Plan.

Agriculture and Food Processing Wastewater Energy Subprogram (WEP)

Implementer: *BASE Energy, Inc.*

The Agriculture and Food Processing Wastewater Energy Subprogram (WEP) helps customers in agriculture, food processing, and beverage processing facilities pursue EE and water conservation projects that yield energy savings in wastewater treatment.



Through the Wastewater Energy Program, BASE provides:

- Economic and engineering feasibility studies for potential projects
- Assistance in project design and implementation to ensure long-term energy savings
- Calculated customer incentives to partially offset capital costs

In 2017, key challenges included marketing and a low volume of projects, which concentrated risk and decreased predictability of results throughout the year.

2017 Strategies and Successes

BASE has partnered with PG&E's Business Energy Solutions representatives to increase customer engagement in both new and existing projects. Outreach and marketing efforts have included leveraging the California League of Food Processors (CLFP) and associated trade conventions.

Industrial Strategic Energy Management

Implementers: TBD

SEM is a holistic, long-term, whole facility approach that uses advanced implementation, measurement and verification services and tools to determine energy savings from all subprogram activities at the facility, including capital projects, maintenance and operation improvements, as well as retro-commissioning. The methodology and subprogram requirements were defined through a collaborative effort between the IOUs, CPUC, and external subject matter experts.

2017 Strategies and Successes

In 2017, PG&E completed a rigorous competitive bidding process for selecting third-party vendors with innovative SEM outreach approaches. The final selection concluded in two different market strategies utilizing the SEM guidelines as defined by the IOUs and CPUC: the two target markets for this subprogram are Food Processing and Manufacturing.

The two selected vendors will be announced in 2018 and will operate their subprograms from 2018-2020.

Agricultural Third-party Program

Dairy and Winery Industry Efficiency Subprogram (DWIES)

Implementer: CLEAResult

The subprogram provides a comprehensive approach to helping dairy, winery, and brewery customers identify and evaluate the energy saving opportunities and facilitating customer action.

The objective of the Coordination Activities is to identify all parties that have programs related to the Dairy and Winery Industry Efficiency Solutions (DWIES) subprogram and to develop a strategy that minimizes customer confusion, avoids duplication of services or costs, and identifies synergistic opportunities. Two previously implemented subprograms by CLEAResult for dairies and wineries were combined into the DWIES subprogram to improve the economics of subprogram implementation.

Strategies and Successes

Dairy barn ventilation fans and controls were a significant contributor to energy savings claimed through DWIES in 2017. DWIES leveraged vendor relationships to coordinate the timing of installation for qualifying high-efficiency ventilation equipment and smart controls to help dairy farmers and their cows beat the summer heat and reduce energy usage and demand. Retrofit projects replaced many small-diameter, inefficient fans with fewer large-diameter, high-efficiency fans, while new load projects successfully moved dairy farmers directly to systems that included highest efficiency, large-diameter fans with variable speed controls.

OBF is promoted and has been well received by this market. Dairy farmers have leveraged OBF as a resource to ensure that projects move forward. The greatest success continued to be the close working relationship between DWIES and PG&E account managers who manage dairy accounts, where customer needs are shared and strategies are developed jointly to maintain a high level of customer service.

DWIES Saves Energy by Keeping Cows Cool

Barn ventilation fans and controls remained a strong source of energy savings at dairies in 2017. DWIES helped keeps cows happy and cool, and dairy farmers saving energy.





Tables and Appendices

Section 1 Energy Savings

Table 1

Electricity and Natural Gas Savings and Demand Reduction (Gross)

Annual Results	2017 Installed Savings (2)	CPUC 2017 Adopted Goals (D.15- 10-028)	% of Goals (2017)
2017 Energy Savings (GWh) – Annual (1)			
PG&E	1,486.9	1,144	130%
TOTAL Energy Savings (GWh) - Annual	1,486.9	1,144	130%
2017 Energy Savings (GWh) – Lifecycle (1)			
PG&E	16,136		
TOTAL Energy Savings (GWh) – Lifecycle	16,136		
2017 Natural Gas Savings (MMth) – Annual (1)			
PG&E	33.2	18.6	179%
TOTAL Natural Gas Savings (MMth) – Annual	33.2	18.6	179%
2017 Natural Gas Savings (MMth) – Lifecycle (1)			
PG&E	406.82		
TOTAL Natural Gas Savings (MMth) – Lifecycle	406.82		
2017 Peak Demand savings (MW) (1)			
PG&E	320.1	193	166%
TOTAL Peak Demand savings (MW)	320.1	193	166%

(1) All energy savings numbers are on a gross basis except Codes and Standards (C&S), which are net with 5% market spillover. Energy savings are based on the actual accomplishments recorded in 2017.

(2) Installed savings for PG&E includes Energy Savings Assistance (ESA) Program; Bay Area Regional Energy Network (Bay REN) and Marin Clean Energy (MCE) as reported in their 2017 Annual Report, filed on April 20, 2018.

Section 2 Emission Reductions

Table 2

Environmental Impacts (Gross) ⁽¹⁾ ⁽²⁾

Annual Results	Annual tons of CO2 avoided	Lifecycle tons of CO2 avoided	Annual tons of NOx avoided	Lifecycle tons of NOx avoided	Annual tons of PM10 avoided	Lifecycle tons of PM10 avoided
2017 Portfolio Targets	N/A	N/A	N/A	N/A	N/A	N/A
PG&E	884,090	9,835,194	230	2,716	46	497
2017 Total	884,090	9,835,194	230	2,716	46	497

(1) Excludes Energy Savings Assistance (ESA) Program, BayREN, and MCE.

(2) All Environmental Impacts are on a gross basis except Codes and Standards (C&S), which are net with 5% market spillover.

Section 3 Expenditures

Table 3

All expenditure data can be found in the “PGE.AnnualExcel.2017.1.xlsx” spreadsheet, under Tab “T-3 Exp’s”. The spreadsheet can be accessed on the Energy Efficiency Statistics website at <http://eestats.cpuc.ca.gov/Views/Documents.aspx>. To access the 2017 spreadsheet, follow these steps:

- In the Report Category, select Annual
- Under Report Options, select 2017
- In the Report Type, select Narrative and Spreadsheets
- In Report Options, select PGE for Utility



Section 4 Cost-Effectiveness

Table 4

Cost Effectiveness (Net)

Annual Results	Total Cost to Billpayers (TRC) (3)	Total Savings to Billpayers (TRC/PAC)	Net Benefits to Billpayers (TRC) (3)	TRC Ratio (4)	Total PAC Cost (3)	PAC Ratio (4)	PAC Cost per kW Saved (\$/kW) (1)	PAC Cost per kWh Saved (\$/kWh) (2)	PAC Cost per therm Saved (\$/therm) (2)
PG&E 2017	\$893,120,463	\$1,646,646,448	\$753,525,985	1.84	\$308,657,088	5.33	-	0.20	1.62
PG&E TOTAL	\$893,120,463	\$1,646,646,448	\$753,525,985	1.84	\$308,657,088	5.33	-	0.20	1.62

(1) The adopted avoided cost methodology does not provide information to provide a meaningful value for PAC Cost per kW. The adopted avoided cost methodology created kWh costs values that vary for each hour of the year that includes kW generation.

(2) PAC cost per kWh or per therm is (PAC Cost x Electric Benefits/Total Benefits)/net kWh) or (PAC Cost x Gas Benefits/Total Benefits)/net therm) respectively per CET based definition provided by CPUC to PG&E via e- mail on April 8, 2016.

(3) The cost-effectiveness calculations are based on the actual accomplishments recorded in 2017.

Includes:

- ESPI payment of \$0 recorded in 2017 per Resolution E-4897, Table 7: PG&E 2017 ESPI awards (D. 13-09-023), Codes and Standards costs and benefits
- Installed savings for Energy Savings Assistance (ESA) Program

Excludes:

- ESA, Bay Area Regional Energy Network (BayREN), and Marin Clean Energy (MCE) Program costs and benefits
- Statewide Emerging Technologies Program costs per D.12-11-015 (p.52)
- The Financing Program OBF Loan Pool amounts (loans issued and repaid) of \$8.3M for 2017 are excluded per D.09-09-047 (p.288).

(4) All savings values include 5% market spillover in cost-effectiveness calculations per D.12-11-015 (OP 37) including Codes and Standards.



Section 5 Bill Impacts

Table 5

Ratepayer Impacts

2017	Electric Average Rate (Res and Non-Res) \$/kwh	Gas Average Rate (Core and Non-Core) \$/therm	Average First Year Bill Savings (\$)	Average Lifecycle Bill Savings (\$)
PG&E Average	\$0.191	\$1.544	\$299,752,327	\$3,312,535,091
PG&E Average	\$0.191	\$1.544	\$299,752,327	\$3,312,535,091

Notes: (Consistent with SPM TRC/PAC/RIM tests, all savings used from actuals and forecasts in this table are net not gross)

(1) Average first year electric bill savings is calculated by multiplying an average electric rate (as of 3/1/17) with first year net kWh energy savings.

(2) Average first year gas bill savings is calculated by multiplying an average gas rate (as of 3/1/17) with first year net therm energy savings.

(3) Total average first year bill savings is the sum of Notes 1 and 2.

(4) Average lifecycle electric bill savings is calculated by multiplying an average electric rate with lifecycle net kWh energy savings.

(5) Average lifecycle gas bill savings is calculated by multiplying an average gas rate with lifecycle net therm energy savings.

(6) Total average lifecycle bill savings is the sum of Notes 4 and 5.

(7) Total Average Bill Savings by Year and Lifecycle Bill Savings include C&S net savings and net lifecycle savings respectively; and includes ESA Program, BayREN, and MCE savings.

Section 6 Savings by End Use

Table 6

Annual Savings By Use Category 2017 Only ⁽¹⁾ ⁽²⁾

Use Category	GWH	% of Total	MW	% of Total	MMTh	% of Total
Appliance or Plug Load	140.29	9.4%	15.89	5.0%	- 0.96	-2.9%
Building Envelope	24.92	1.7%	6.03	1.9%	1.06	3.2%
Compressed Air	3.38	0.2%	0.06	0.0%	-	0.0%
Commercial Refrigeration	74.47	5.0%	11.54	3.6%	0.85	2.5%
Codes & Standards	89.74	6.0%	13.72	4.3%	- 0.00	0.0%
Food Service	3.17	0.2%	0.52	0.2%	0.73	2.2%
HVAC	137.34	9.2%	51.05	15.9%	6.41	19.3%
Irrigation	22.28	1.5%	11.36	3.5%	-	0.0%
Lighting	469.27	31.6%	77.11	24.1%	- 2.59	-7.8%
Non-Savings Measure	-	0.0%	-	0.0%	-	0.0%
Process Distribution	39.78	2.7%	10.50	3.3%	3.65	11.0%
Process Drying	-	0.0%	-	0.0%	-	0.0%
Process Heat	6.09	0.4%	0.67	0.2%	4.20	12.6%
Process Refrigeration	21.04	1.4%	2.43	0.8%	0.06	0.2%
Recreation	163.61	11.0%	15.89	5.0%	0.03	0.1%
Service	7.95	0.5%	0.75	0.2%	0.83	2.5%
Service and Domestic Hot Water	15.65	1.1%	1.75	0.5%	10.21	30.7%
Whole Building	267.93	18.0%	100.86	31.5%	8.77	26.4%
PG&E ANNUAL PORTFOLIO SAVINGS	1,486.9	100.0%	320.1	100.0%	33.2	100.0%

(1) All energy savings numbers are on a gross basis except Codes and Standards are net with 5% market spillover.

(2) Includes savings for ESA Program; BayREN and MCE savings as reported in their 2017 Annual Report filed on April 20, 2018.

(3) ESA Program savings are included in Whole Building use category.

Section 7 Commitments

Table 7
Commitments ⁽⁴⁾

Commitments Made in the Past with Expected Implementation after December 2010-2012				
	Committed Funds ¹	Expected Energy Savings		
2010-2012 ¹	\$	GWH	MW	MMth
Resource	N/A	N/A	N/A	N/A
Non-Resource	N/A	N/A	N/A	N/A
Codes & Standards	N/A	N/A	N/A	N/A
PG&E Total	N/A	N/A	N/A	N/A
Commitments Made in the Past Year with Expected Implementation after December 2015				
	Committed Funds ²	Expected Energy Savings		
2013-2015 ²	\$	GWH	MW	MMth
Resource	N/A	N/A	N/A	N/A
Non-Resource	N/A	N/A	N/A	N/A
Codes & Standards	N/A	N/A	N/A	N/A
PG&E Total	N/A	N/A	N/A	N/A
Commitments Made in the Past Year with Expected Implementation after December 2016				
	Committed Funds ³	Expected Energy Savings		
2016 ³	\$	GWH	MW	MMth
Resource	N/A	N/A	N/A	N/A
Non-Resource	N/A	N/A	N/A	N/A
Codes & Standards	N/A	N/A	N/A	N/A
PG&E Total	N/A	N/A	N/A	N/A
Commitments Made in the Past Year with Expected Implementation after December 2017				
	Committed Funds ³	Expected Energy Savings		
2017 ³	\$	GWH	MW	MMth
Resource	42,456,985	203.5	27.9	8.1
Non-Resource	N/A	N/A	N/A	N/A
Codes & Standards	N/A	N/A	N/A	N/A
PG&E Total	42,456,985	203.5	27.9	8.1

⁽¹⁾ Note: Committed funds are associated with the 2010-2012 program cycle. These funds are reserved or encumbered for future work permitted per Ordering Paragraph 13 and Conclusion of Law 12 of D.12-11-015.

⁽²⁾ Note: Committed funds are associated with the 2013-2015 program cycle. These funds are reserved or encumbered for future work permitted per the EESTATS CPUC Guidance Document and EE decision (D.15-10-025).



⁽³⁾ Note: Committed funds are associated with the 2016, 2017 program years, respectively. These funds are reserved or encumbered for future work permitted per the EESTATS CPUC Guidance Document and EE decision (D.15-10-025).

Committed Funds for 2017 include incentives related to PG&E EE projects committed in prior year(s) but not completed by December 2017.

⁽⁴⁾ Note: All energy savings numbers are on a gross basis.

Section 8 Shareholder Performance Incentives

2017 requested and approved shareholder earnings are from EE activities performed in program years 2015 and 2016.

The mechanism and payment associated with 2016 program activities was based on the Efficiency Savings and Performance Incentive (ESPI) mechanism as approved in D.13-09-023. The ESPI mechanism is a multi-component incentive structure. The ESPI mechanism was established with the goal and objective to encourage and motivate IOUs to invest in EE programs that are quantifiable, as well as other non-quantifiable programs that help transform the market. The four components contributing to 2016 ESPI earnings are:

1. **Component 1:** A performance award for energy savings of up to 9% of the resource program budget (excluding C&S program budgets),
2. **Component 2:** A performance award for ex ante review activities of up to 3% of resource program budget (excluding C&S program budgets),
3. **Component 3:** A management fee for C&S programs of up to 12% of C&S program budgets, and
4. **Component 4:** A management fee for non-resource programs of up to 3% of non-resource program budgets.

PG&E filed an Advice Letter on September 1, 2017 requesting an award for certain EE Program Year 2015 and 2016 activities including custom projects, uncertain measures, and a true-up of the 2013-2014 incentive payment.

The earnings requested in 2017 were approved in Resolution E-4897 in response to PG&E's Advice Letters Advice Letters 3880-G/5136-E and 3880-G-A/5136-E-A, per direction from D.13-09-023. The table below provides the final payment awarded to PG&E for program years 2015 and 2016.

The final shareholder incentive payment was impacted by the 2013-2014 Program Saving True-Up and the 2006-2008 RRIM Adjustment, which deducted \$1.1 million and \$5.8 million, respectively, from the final incentive payment.



2017 Requested and Approved ESPI

Program Year for Activities Paid	Year Incentive Requested and Approved	Authorizing Decision	Shareholder Incentive
2015	2017	Resolution E-4897	\$9.5M
2016	2017	Resolution E-4897	\$13.5M
2013-2014 Savings True-Up	2017	Resolution E-4897	-\$1.1M
2006-2008 RRIM Adjustment	2017	Resolution E-4897	-\$21.9M



Appendix A

PG&E Program ID Numbers

Program ID	Program Name
PGE21001	Residential Energy Advisor
PGE210010	Pay for Performance Pilot
PGE210011	Residential Energy Fitness program
PGE21002	Plug Load and Appliances
PGE21003	Multifamily Energy Efficiency
PGE21004	Energy Upgrade California
PGE21005	Residential New Construction
PGE21006	Residential HVAC
PGE21007	California New Homes Multifamily
PGE21008	Enhance Time Delay Relay
PGE21009	Direct Install for Manufactured and Mobile Homes
PGE21011	Commercial Calculated Incentives
PGE210112	School Energy Efficiency
PGE210118	Retail Energy Efficiency
PGE210119	LED Accelerator
PGE21012	Commercial Deemed Incentives
PGE210123	Healthcare Energy Efficiency Program
PGE210126	K-12 Private Schools and Colleges Audit Retro
PGE21013	Commercial Continuous Energy Improvement
PGE210135	Water Infrastructure and System Efficiency
PGE210137	Waypoint Commercial Outreach
PGE210138	Data Center Air Flow and Temp Optimization
PGE210139	SEI Energize Schools Program
PGE21014	Commercial Energy Advisor
PGE210143	Hospitality Program
PGE21015	Commercial HVAC
PGE21017	Commercial Industrial Boiler Efficiency
PGE21018	EnergySmart Grocer
PGE21021	Industrial Calculated Incentives
PGE210210	Industrial Retrocommissioning Program
PGE210211	Light Industrial Energy Efficiency
PGE210212	Compressed Air and Vacuum Optimization Program
PGE210213	Small Petrochemical Energy Efficiency
PGE21022	Industrial Deemed Incentives
PGE21023	Industrial Continuous Energy Improvement
PGE21024	Industrial Energy Advisor
PGE21025	California Wastewater Process Optimization
PGE21026	Energy Efficiency Services for Oil Production
PGE21027	Heavy Industry Energy Efficiency Program
PGE21029	Refinery Energy Efficiency Program
PGE21030	Industrial Strategic Energy Management



Program ID	Program Name
PGE21031	Agricultural Calculated Incentives
PGE210311	Agriculture and Food Processing Wastewater Energy
PGE210312	Dairy and Winery Industry Efficiency Solutions
PGE21032	Agricultural Deemed Incentives
PGE21033	Agricultural Continuous Energy Improvement
PGE21034	Agricultural Energy Advisor
PGE21036	Industrial Refrigeration Performance Plus
PGE21039	Comprehensive Food Process Audit & Resource Efficiency
PGE21041	Primary Lighting
PGE21042	Lighting Innovation
PGE21043	Lighting Market Transformation
PGE21051	Building Codes Advocacy
PGE21052	Appliance Standards Advocacy
PGE21053	Compliance Improvement
PGE21054	Reach Codes
PGE21055	Planning and Coordination
PGE21056	Code Readiness
PGE21061	Technology Development Support
PGE21062	Technology Assessments
PGE21063	Technology Introduction Support
PGE21071	Centergies
PGE21072	Connections
PGE21073	Strategic Planning
PGE21081	Statewide DSM Coordination & Integration
PGE21091	On-Bill Financing (excludes Loan Pool)
PGE210911	On-Bill Financing Alternative Pathway
PGE21091LP	Financing Loan Pool Addition
PGE21092	Third-Party Financing
PGE21093	New Financing Offerings
PGE2110011	California Community Colleges
PGE2110012	University of California/California State University
PGE2110013	State of California
PGE2110014	Department of Corrections and Rehabilitation
PGE2110051	Local Government Energy Action Resources (LGEAR)
PGE2110052	Strategic Energy Resources
PGE211007	Association of Monterey Bay Area Governments (AMBAG)
PGE211009	East Bay
PGE211010	Fresno
PGE211011	Kern
PGE211012	Madera
PGE211013	Marin County
PGE211014	Mendocino-Lake County
PGE211015	Napa County
PGE211016	Redwood Coast
PGE211018	San Luis Obispo County
PGE211019	San Mateo County
PGE211020	Santa Barbara



Program ID	Program Name
PGE211021	Sierra Nevada
PGE211022	Sonoma County
PGE211023	Silicon Valley
PGE211024	San Francisco
PGE211025	Savings by Design (SBD)
PGE211026	North Valley
PGE211027	Sutter Buttes
PGE211028	Yolo
PGE211029	Solano
PGE211030	Northern San Joaquin Valley
PGE211031	Valley Innovative Energy Watch (VIEW)

Appendix B

Regulatory Decisions, Rulings, and Advice Letters

EE Rulemaking Phase I

In 2014, the Commission completed Phase I of the *Order Instituting Rulemaking Concerning Energy Efficiency Rolling Portfolios, Policies, Programs, Evaluation and Related Issues* (R.13-11-005) that was issued on November 21, 2013. Phase I focused on approving EE funding and portfolios for 2015. PG&E filed its *Energy Efficiency 2015 Funding Proposal* on March 26, 2014. On October 24, 2014, the Commission issued approved D.14-10-046: *Decision Establishing Energy Efficiency Savings Goals and Approving 2015 Energy Efficiency Programs and Budgets*.

The Phase I Decision, as corrected by D.15-01-002 and D.15-01-023, approved PG&E's total 2015 EE portfolio budget of \$430.1 million, including \$379.3 million for PG&E's program budget, \$16.8 million for EM&V, \$12.8 million for BayREN's EE programs, and \$1.2 million for MCE's EE programs. The Phase I Decision also approved PG&E's request for \$3.3 million for 2015 DR funding for IDSM.

The Phase I Decision (at pp. 30-32) determined that 2015 is the third year of a 2013-2015 portfolio cycle, allowing the IOUs and RENs to use unspent 2013-2014 funds in 2015, to count savings from 2013-2014 towards 2015 goals and cost effectiveness, and to calculate regulatory caps and targets. The Commission directed Staff to undertake EM&V activities for 2013-2014 and 2015 combined.

The Phase I Decision (at OP 21 and pp. 31-32) leaves the 2015 programs and funding in place until the earlier of when the Commission provides superseding direction, or 2025.

The Phase I Decision (at OP 16) required the IOUs and MCE to file Tier 2 advice letters within 60 days to reflect the budget adjustments adopted in the decision, including recalculated TRC and PAC test results exceeding a 1.0 threshold for 2015. PG&E filed this advice letter on December 15, 2014, with superseding supplemental advice letters in 2015, as detailed below. The Phase I Decision also required a number of other advice letters to be filed in 2015.

EE Rulemaking Phase IIa

On February 24, 2015, the Commission issued the Scoping Memorandum for Phase II of this proceeding. Based on prehearing conference statements from the parties involved, the Commission identified three broad categories of items to address in Phase II: (1) developing "Rolling Portfolio" review processes; (2) providing guidance on changes for 2016 portfolios; and (3) updating various portfolio metrics (e.g., Database for Energy Efficiency Resources (DEER) values) to keep portfolios on course through 2016 and beyond.

On October 28, 2015, the Commission issued D.15-10-028: *Decision Re Energy Efficiency Goals for 2016 and Beyond and Energy Efficiency Rolling Portfolio Mechanics*. (Phase IIa Decision). In this decision, the Commission adopted energy savings goals for EE portfolios from 2016 to 2024; established a "Rolling Portfolio" process for reviewing and revising portfolios; and updated various EE program portfolio metrics, including Database of Energy Efficient Resources values.



EE Rulemaking Phase IIb

On August 25, 2016, the Commission issued D.16-08-019: *Decision Providing Guidance for Initial Energy Efficiency Rolling Portfolio Business Plan Filings*. (Phase IIb Decision). In this decision, the Commission set forth policy guidance on several issues related to the filing of EE business plans, as previously contemplated in D.15-10-028. The decision also addressed next steps for regional energy networks, the appropriate baselines to be used to measure energy savings for specific programs and measures, transition for statewide and third-party programs, and changes to the evaluation and shareholder incentive frameworks.

The Commission issued a Scoping Memo on April 14, 2017 to evaluate the reasonableness of the IOU, REN, and CCA proposals for EE business plans, filed in January 2017. The Scoping Memo identified the scope of issues to be evaluated in the proceeding and established the schedule for 2017 activities, which included requests for supplemental information, revised metrics, and comprehensive solicitation plans. The Commission issued the Proposed Decision Addressing Third-party Solicitation Process for Energy Efficiency on November 13, 2017. The Proposed Decision was subsequently finalized as D.18-01-004 in January 2018, and established solicitation oversight mechanisms, directed the IOUs to develop standard contract terms, and set the schedule for transitioning to the third-party model.

On October 2, 2017, the Commission issued D. 17-09-025: *Decision Adopting Energy Efficiency Goals for 2018-2030*. In this decision, the Commission adopted energy savings goals for EE portfolios from 2018 to 2030.

EE Rulemaking Phase III

On November 2, 2016, the Commission issued the Scoping Memorandum for Phase III of this proceeding. The Commission acknowledged that this proceeding was already well underway when Senate Bill (SB) 350 (2015) and Assembly Bill (AB) 802 (2015) both became law, creating a significant impact on the Commission's oversight of EE programs and policy. The key provisions of SB 350 for EE include a goal of doubling the amount of EE savings in California by 2030, with emphasis on market transformation and pay-for-performance approaches, among other things. AB 802's provisions primarily affect the manner in which baselines are set for measuring energy savings towards goals. All of these topics were covered, to some degree, in D.16-08-019. However, two specific areas warrant additional policy development in Phase III: (1) market transformation, as discussed in SB 350 and (2) custom projects, particularly in the industrial sector, as discussed in D.16-08-019.

This proceeding is still the ongoing venue for any policymaking related to EE. The ongoing policy issues identified including: updates to DEER and EE potential and goals; updates to the EE Strategic Plan; updates to the EM&V framework; the role of the California Technical Forum; updates to the ESPI mechanism; updates to the cost-effectiveness framework for EE, in coordination with the integrated distributed energy resource (IDER) rulemaking (R.14-10-003); coordination with statewide marketing, education, and outreach efforts; approached for evaluations using normalized metered energy consumption and/or dynamic baselines; and Industry Standard Practice determinations.

Advice Letters

PG&E filed the following advice letters related to EE in 2017.



- 1) Second Supplemental: PG&E's 2017 Energy Efficiency Annual Budget Advice Letter in Compliance with Decision 15-10-028, Ordering Paragraph 4, filed January 4, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3753-G-B.pdf
- 2) California Energy Efficiency Coordinating Committee Meeting Plans and Budget for Program Year 2017, filed January 30, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3801-G.pdf
- 3) Request For Authority to Shift Energy Efficiency Funds into the 2016 Statewide Residential Energy Efficiency Program, filed February 8, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3808-G.pdf
- 4) Request for Authority to Continue the Retail Products Platform Pilot within PG&E's Residential Energy Efficiency Plug-Load and Appliances Sub-Program, filed March 8, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3821-G.pdf
- 5) Proposed Modifications to Pacific Gas and Electric Company's On-Bill Financing Loan Programs and Associated Schedules E-OB and G-OB, filed May 3, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3840-G.pdf
- 6) Third Supplemental: PG&E's 2017 Energy Efficiency Annual Budget Advice Letter in Compliance with Decision 15-10-028, Ordering Paragraph 4, filed May 5, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3753-G-C.pdf
- 7) Request for Approval of PG&E's Assembly Bill 793 Implementation Plan, filed May 22, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3843-G.pdf
- 8) PG&E's Request for CPUC Approval of the Cancellation of Residential HVAC Subprogram HVAC Code Compliance Incentive Program Pilot, filed June 13, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3853-G.pdf
- 9) Fourth Supplemental: PG&E's 2017 Energy Efficiency Annual Budget Advice Letter in Compliance with Decision 15-10-028, Ordering Paragraph 4, filed July 3, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3753-G-D.pdf
- 10) Southern California Edison Company, Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Gas Company's 2016 Energy Efficiency Incentive Award Earnings Rates and Award Caps, filed July 6, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3864-G.pdf
- 11) California Energy Efficiency Coordinating Committee Meeting Plans and Budget for Program Year 2017, filed July 27, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3871-G.pdf
- 12) Request of Pacific Gas and Electric Company for 2015 and 2016 Energy Efficiency Incentive Award, filed September 1, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3880-G.pdf



- 13) PG&E's 2018 Energy Efficiency Annual Budget Advice Letter in Compliance with Decision 15-10-028, Ordering Paragraph 4, filed September 1, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3753-G.pdf
- 14) Supplemental: Request of Pacific Gas and Electric Company for 2015 and 2016 Energy Efficiency Incentive Award, filed September 28, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3880-G-A.pdf
- 15) Advice Filing Pursuant to Decision 17-03-026 Regarding Pacific Gas and Electric Company's 2017 through 2020 Financing Pilots Budget, filed November 3, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3904-G.pdf
- 16) Supplemental: PG&E's 2018 Energy Efficiency Annual Budget Advice Letter in Compliance with Decision 15-10-028, Ordering Paragraph 4, filed November 22, 2017
https://www.pge.com/tariffs/assets/pdf/adviceletter/GAS_3881-G-A.pdf

Appendix C

Third-party Contract List

Program ID	Program Name	Primary Sector (Market Segment)	Sector (Sub-segment / Type of Customers)	Delivery Channel	Vendor	Length (Years)	Dollar Value
PGE210011	Residential Energy Fitness Program	Residential	Residential (Res)	Downstream	RICHARD HEATH & ASSOCIATES INC	3.0	
PGE21007	California New Homes Multifamily	Residential	Residential (Res)	Midstream/Downstream	TRC SOLUTIONS INC	3.2	
PGE21008	Enhance Time Delay Relay	Residential	Residential (Res)	Downstream	PROCTOR ENGINEERING GRP LTD	3.2	
PGE21009	Direct Install for Manufactured and Mobi	Residential	Residential (Res)	Downstream	ENERGY EFFICIENCY INC	3.0	
PGE210112	School Energy Efficiency	Commercial	Commercial (Com)	Downstream	CLEARRESULT CONSULTING INC	3.8	
PGE210118	Retail Energy Efficiency	Commercial	Commercial (Com)	Downstream	MATRIX ENERGY SERVICES INC	2.2	
PGE210119	LED Accelerator	Commercial	Commercial (Com)	Downstream	COHEN VENTURES INC	3.0	
PGE210123	Healthcare Energy Efficiency Program	Commercial	Commercial (Com)	Downstream	WILLDAN ENERGY SOLUTIONS	3.0	
PGE210135	Water Infrastructure System Efficiency	Industrial	Industrial (Ind)	Downstream	LINCUS INC	3.0	
PGE210138	Data Center Air Flow and Temp Optimization	Commercial	Commercial (Com)	Downstream	CLEARRESULT CONSULTING INC	2.8	
PGE210139	SEI Energize Schools	Commercial	Commercial (Com)	Downstream	STRATEGIC ENERGY INNOVATIONS	4.8	
PGE210143	Hospitality Program	Commercial	Commercial (Com)	Downstream	ECOLOGY ACTION OF SANTA CRUZ	3.0	
PGE21017	Commercial Industrial Boiler Efficiency	Commercial	Commercial (Com)	Downstream	ENOVITY INC	3.2	



Program ID	Program Name	Primary Sector (Market Segment)	Sector (Sub-segment / Type of Customers)	Delivery Channel	Vendor	Length (Years)	Dollar Value
PGE21018	EnergySmart Grocer	Commercial	Commercial (Com)	Downstream	CLEARRESULT CONSULTING INC	2.8	
PGE210210	Industrial Retrocommissioning Program	Industrial	Industrial (Ind)	Downstream	NEXANT INC	3.0	
PGE210211	Light Industrial Energy Efficiency Prog	Industrial	Industrial (Ind)	Downstream	NEXANT INC	3.0	
PGE210212	Industrial Compressed Air Systems Efficiency	Industrial	Industrial (Ind)	Downstream	ADVANCED AIR LEAK DETECTION	3.1	
PGE210213	Small Petrochemical EE Program	Industrial	Industrial (Ind)	Downstream	CB&I LLC	3.0	
PGE210213	Small Petrochemical EE Program	Industrial	Industrial (Ind)	Downstream	APTIM ENVIRONMENTAL & INFRASTRUCTUR	0.9	
PGE21025	California Wastewater Process Optimization	Industrial	Industrial (Ind)	Downstream	QUANTUM ENERGY SERVICES AND	3.0	
PGE21026	Energy Efficiency Services for Oil Production	Industrial	Industrial (Ind)	Downstream	CLEARRESULT CONSULTING INC	3.5	
PGE21026	Energy Efficiency Services for Oil Production	Industrial	Industrial (Ind)	Downstream	ENERNOC INC	2.2	
PGE21027	Heavy Industry Energy Efficiency Program	Industrial	Industrial (Ind)	Downstream	LOCKHEED MARTIN CORPORATION	3.0	
PGE21029	Refinery Energy Efficiency Program	Industrial	Industrial (Ind)	Downstream	NEXANT INC	3.0	
PGE210311	Agriculture and Food Processing Wastewater Energy	Agricultural	Agricultural (Ag)	Downstream	BASE ENERGY INC	3.2	
PGE210312	Dairy & WIES	Agricultural	Agricultural (Ag)	Downstream	CLEARRESULT CONSULTING INC	2.8	
PGE21036	Industrial Refrigeration Performance Plu	Cross-Cutting	Agricultural (Ag)	Downstream	VCCT INC	3.0	
PGE21039	Comprehensive Food Process Audit & Resou	Agricultural	Agricultural (Ag)	Downstream	CLEARRESULT CONSULTING INC	2.8	



Program ID	Program Name	Primary Sector (Market Segment)	Sector (Sub-segment / Type of Customers)	Delivery Channel	Vendor	Length (Years)	Dollar Value
PGE21039	Comprehensive Food Process Audit & Resou	Agricultural	Agricultural (Ag)	Downstream	ENERNOC INC	2.2	
PGE2110051	Local Govt Energy Action Resources LGEAR	Public	Residential (Res)	Downstream	STAPLES & ASSOCIATES	1.0	
PGE211007	Association of Monterey Bay Area Govts	Public	Commercial (Com)	Downstream	ECOLOGY ACTION OF SANTA CRUZ	3.0	
PGE211010	Fresno	Public	Commercial (Com)	Downstream	RICHARD HEATH & ASSOCIATES INC	5.2	
PGE211011	Kern	Public	Commercial (Com)	Downstream	STAPLES & ASSOCIATES	3.0	
PGE211012	Madera	Public	Commercial (Com)	Downstream	RICHARD HEATH & ASSOCIATES INC	5.2	
PGE211014	Mendocino-Lake County	Public	Commercial (Com)	Downstream	ENERGY ALLIANCE ASSOCIATION	4.2	
PGE211015	Napa County	Public	Commercial (Com)	Downstream	ENERGY ALLIANCE ASSOCIATION	4.2	
PGE211018	San Luis Obispo County	Public	Commercial (Com)	Downstream	STAPLES & ASSOCIATES	3.0	
PGE211019	San Mateo County	Public	Commercial (Com)	Downstream	ECOLOGY ACTION OF SANTA CRUZ	3.0	
PGE211020	Santa Barbara	Public	Commercial (Com)	Downstream	STAPLES & ASSOCIATES	3.0	
PGE211022	Sonoma County	Public	Commercial (Com)	Downstream	ENERGY ALLIANCE ASSOCIATION	4.2	
PGE211023	Silicon Valley	Public	Commercial (Com)	Downstream	ECOLOGY ACTION OF SANTA CRUZ	3.0	
PGE211029	Solano	Public	Residential (Res)	Downstream	ENERGY ALLIANCE ASSOCIATION	4.2	
PGE211031	Valley Innovative Energy Watch (VIEW)	Public	Residential (Res)	Downstream	STAPLES & ASSOCIATES	3.0	
PGE21001	Residential Energy Advisor	Residential	Residential (Res)	Downstream	OPOWER INC	4.8	
PGE21002	Plug Load and Appliances	Residential	Residential (Res)	Midstream/Downstream	ICF RESOURCES LLC	4.0	



Program ID	Program Name	Primary Sector (Market Segment)	Sector (Sub-segment / Type of Customers)	Delivery Channel	Vendor	Length (Years)	Dollar Value
PGE21004	Energy Upgrade California	Residential	Residential (Res)	Downstream	TRC SOLUTIONS INC	3.2	
PGE21004	Energy Upgrade California	Residential	Residential (Res)	Downstream	BUILD IT GREEN	2.0	
PGE21005	Residential New Construction	Residential	Residential (Res)	Upstream	TRC SOLUTIONS INC	3.2	
PGE21015	Commercial HVAC	Commercial	Commercial (Com)	Upstream/Midstream	PROCTOR ENGINEERING GRP LTD	3.2	
PGE21015	Commercial HVAC	Commercial	Commercial (Com)	Upstream/Midstream	HONEYWELL INTERNATIONAL INC	2.2	
PGE21030	Industrial Strategic Energy Management	Industrial	Industrial (Ind)	Downstream	GREENBERG INC	8.3	
PGE21034	Agricultural Energy Advisor	Agricultural	Agricultural (Ag)	Downstream	TRC SOLUTIONS INC	4.1	
PGE21034	Agricultural Energy Advisor	Agricultural	Agricultural (Ag)	Downstream	CALIFORNIA STATE UNIVERSITY	2.2	
PGE210010	Pay for Performance Pilot	Residential	Residential (Res)	Downstream	HIGH ENERGY ANALYTICS INC	-	
PGE210010	Pay for Performance Pilot	Residential	Residential (Res)	Downstream	OPEN ENERGY EFFICIENCY	-	
PGE210010	Pay for Performance Pilot	Residential	Residential (Res)	Downstream	SUSTAINABLE SPACES LLC	-	
PGE210010	Pay for Performance Pilot	Residential	Residential (Res)	Downstream	ENERGYSAVVY INC	-	
PGE211026	North Valley	Public	Commercial (Com)	Downstream	RICHARD HEATH & ASSOCIATES INC	5.2	
PGE211030	Northern San Joaquin Valley	Public	Commercial (Com)	Downstream	RICHARD HEATH & ASSOCIATES INC	5.2	
PGE211027	Sutter Buttes	Public	Commercial (Com)	Downstream	RICHARD HEATH & ASSOCIATES INC	5.2	
PGE211028	Yolo	Public	Commercial (Com)	Downstream	RICHARD HEATH & ASSOCIATES INC	5.2	
	Grand Total						\$344,566,415



- (1) This table only covers programs, not services (consistent with Table T-3 which only lists Third-party programs).
- (2) A non-redacted and redacted version have been produced. The redacted information is the individual values of the contracts. The Total Portfolio contract value is public.
- (3) Primary sector and sector classifications are from CEDARS.
- (4) Delivery channels are consistent with the Joint AL for ESPI Coefficients and CEDARS.
- (5) Length of contract is the timeframe between contract effective date through the contract termination date.
- (6) PG&E was unable to confirm the data required for the newly required "size" field.
- (7) Contract duration includes 2017 and beyond. Contracts concluded prior to 2017 are excluded. Contracts with "end dates" in 2017 and beyond are included.
- (8) Vendors and subprograms in this list should qualify under the old 20% third party definition, which includes both 3P implementers and any CORE/GP competitively-bid implementer contracts.