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Witnesses:	G.Barsley, J, Mack, K. Rodriguez, M. Thomas, M. Wallenrod, T. Weber, K. Wood

SOUTHERN CALIFORNIA
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(U 338-E)

Southern California Edison Company's Energy Efficiency Rolling Portfolio Business Plan For 2018-2025

Before the

Public Utilities Commission of the State of California

Rosemead, California

January 17, 2017

SCE's Energy Efficiency Rolling Portfolio Business Plan for 2018-2025

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I.

Introduction & Organization

The Energy Efficiency (EE) Rolling Portfolio Business Plan was established by the California Public Utilities Commission (Commission) in Decision (D.) 15-10-028. That decision identified three key documents to be developed by EE Program Administrators (PAs) on a recurring basis to meet the guidance provided by the Commission in the EE Strategic Plan and to request funding for their EE portfolios. The three key documents are: (1) business plans, (2) annual budget advice letters, and (3) implementation plans.[1] The business plan is periodically filed by a PA to "explain at a relatively high level of generality how PAs will effectuate the strategic plan."[2] The business plan "leads to a Commission guidance decision adopting the business plan and setting budget expectations to be more fully developed in annual budget filings."[3] The annual budget advice letter, filed in September of each year, provides a detailed budget that results in spending authorization and revenue requirement for rate recovery purposes.[4] Implementation plans, which are not filed with the Commission, provide details on EE programs and implementation strategies.[5]

In D.15-10-028, the Commission adopted a stakeholder process to enable interested parties to collaborate with PAs and provide recommendations and advice.[6] The adopted process is led by the California Energy Efficiency Coordinating Committee (CAEECC). Among other tasks, one of the primary functions is to "[p]rovide input into development of business plans *prior to and throughout the drafting process*."[7] Southern California Edison (SCE) participated in all CAEECC meetings during the development of its business plan and solicited feedback from CAEECC stakeholders on early drafts of its business plan. SCE addressed each of the formal CAEECC comments on SCE's business plan in the

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[1] D.15-10-028, p. 43.
[2] *Id*. at 46.
[3] *Id.* at 43.
[4] *Id*. at 62.
[5] *Id*. at 43.
[6] *Id*. at 70-79.
[7] *Id*. at 73.

designated Stakeholder Tracking Workbook, which is also being submitted as Exhibit 3 to the Business Plan Application.

D.15-10-028 provided high-level guidance on the contents of the PAs' business plans. It also required Commission Staff to develop a white paper to further define what information should be included in the business plans, followed by informal comments on the white paper, leading to a guidance document for business plan contents.[8] On May 2, 2016, Energy Division issued the Energy Efficiency Rolling Portfolio Business Plan Guidance white paper.[9] SCE's business plan includes all of the required content and largely follows the structure in the Energy Division guidance document. The Energy Division guidance document was accompanied by a checklist for items that are required to be in the business plan. SCE has included this checklist in Appendix A and identified where in its business plan each required section can be found. The PAs also collaborated with stakeholders on the CAEECC to develop a consensus outline that incorporates the Energy Division guidance and additional items stakeholders deemed important. SCE's business plan closely follows this outline, though some changes were necessary to improve the flow of the document and minimize redundancies.

Business plans are intended to cover a time period of up to ten years.[10] This first business plan will cover the eight years from 2018 – 2025. This is because D.14-10-046 already authorized funding amounts for the PAs through 2025.[11] SCE is not requesting more funding than what was already authorized in D.14-10-046 and D.15-01-002, therefore, this plan will be consistent with the timeframe for the already approved funding. SCE will need to file another business plan, at a minimum, no less than one year before current funding authorization expires in 2025.[12]

SCE's business plan is organized into nine chapters. This chapter, Chapter I, provides background on the business plan concept and describes the organization of SCE's plan. Chapter II

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[8] *Id.* at 57-58.

[9] An updated version was issued on May 10, 2016 to correct an error in the original version.

[10] D.15-10-028, p. 46.

[11] D.14-10-046, p. 167 (OP 21). *See also* D.15-01-002 (correcting errors in D.14-10-046) and D.15-01023 (further correcting technical errors in D.15-01-002).

[12] *See* D.15-10-028, p. 46.

presents SCE's vision of EE in California, including discussion of important policy issues for the Commission's consideration. Chapter III provides a summary of SCE's proposed EE portfolio for the 2018-2025 timeframe, including: SCE's vision and goals for its portfolio; drivers of EE; high-level strategies SCE will use to achieve its vision; descriptions of how SCE will comply with the requirements for statewide administration and third-party solicitations; key portfolio data such as budget, forecast energy and demand savings, cost-effectiveness; and proposed metrics. Chapters IV through IX provide similar information for each of the six sectors: Commercial, Industrial, Agricultural, Residential, Public, and Cross-Cutting.

II.

SCE's Vision for EE in California

California's electric industry is being rapidly reshaped by several major trends including ambitious public policy goals to reduce greenhouse gas emissions (GHG), broad penetration of renewable generation, and consumers who are looking for more choices in how they procure and manage their energy. Demand-side management (DSM) and in particular, EE, can be an important strategic tool in addressing these challenging trends. EE can enable greater reductions in GHGs, support system and local distribution reliability, reduce system costs, and provide customers with ways to better manage their energy usage and utility bills. SCE remains committed to providing value for its customers by delivering EE at an affordable cost. Consistent with this strategy, SCE proposed to reduce authorized expenditures for EE in 2017 by approximately 16 percent compared to the current authorized budget in D. 15-01-002.

SCE has been successful in delivering value for its customers by pursuing several activities to optimize its EE portfolio including improving the performance of existing programs, canceling non-cost-effective programs, reallocating resources from low to high performing measures/programs, pursuing new sourcing strategies, and directing resources to serve high-value locational resource needs. SCE also remains committed to pursuing new sourcing and delivery strategies in an effort to capture innovation and improve the customer experience and reduce the cost of delivery.

As the industry evolves, it is crucial that the regulatory framework for DSM in California keep pace so that DSM can reach its maximum usefulness as a strategic tool in achieving the state's ambitious energy goals. This will allow California's investor-owned utilities (IOUs) to assemble DSM portfolios that better address today's grid challenges.

In particular, SCE recommends the following regulatory actions to improve DSM outcomes in California:

- *Optimize DSM resource value through an integrated resource planning process*: Consistent, integrated resource planning will better optimize the DSM portfolio

within the full context of distributed energy resources[13] (DER) and the entire supply-demand resource portfolio. This effort is currently being addressed as part of the Integrated Resource Plan and Long-Term Procurement Plan (IRP-LTPP) proceeding. Accomplishment of a common DSM goal will require clearer consensus on DSM objectives, goals, and measures.

- *Simplify and streamline DSM regulatory procedures to optimize funding and enable timely portfolio adjustments across resource types*: A unified process for DSM program review and funding will allow utilities greater flexibility to allocate funds between programs, resources (e.g., between EE and DR), and procurement vehicles in order to achieve overarching DSM goals. There are currently a multitude of DSM-related proceedings that can be consolidated and streamlined, such as combining EE and DR funding authorizations.
- *Count all DSM savings towards a common DSM goal*. DSM Programs (e.g., EE and DR) and new Request for Offers (RFO) solicitations often compete for the same customers and resources. Typically the same vendors are competing for the same projects in different delivery forums. Ideally, coordination among DSM proceedings would facilitate the use of both market-based and programmatic approaches to achieve a common goal at least cost.
- *Maximize the use of Meter-based Measurement:* Ex-post verification and early evaluation, measurement, and verification (EM&V) plans at project onset provide an opportunity to remove the uncertainty from estimated ex ante savings by using meter-based savings as validation for "actual savings" for existing baseline conditions. To achieve this outcome, SCE recommends that written EM&V requirements be

[13] The Commission defines DERs as "distribution-connected distributed generation resources, energy efficiency, energy storage, electric vehicles, and demand response technologies." California's Distributed Energy Resources Action Plan: Aligning Vision and Action, p.1, *available at* http://www.cpuc.ca.gov/uploadedfiles/cpuc_public_website/content/about_us/organization/commissioners/michael_j._picker/2016-09-26%20der%20action%20plan%20final3.pdf.

established and kept static for all projects pursuing existing baseline savings through normalized metered energy consumption (NMEC) (i.e., EM&V requirements should not be established on a per project basis). This will help to set customer expectations and remove the uncertainty of changing requirements thereby facilitating customer project development and implementation. SCE also recommends that because savings and incentives for these projects will be claimed / paid after EM&V verification,[14] no parallel ex ante review is necessary. This would be consistent with treatment for other programs that claim savings ex post, such as Behavioral programs.

- *Promote customer adoption by meeting customer needs and reducing customer confusion*: Coordination of customer-friendly delivery by third parties and utilities serving as DSM portfolio managers will reduce customer confusion and help the IOUs procure DSM resources in a more cost-effective manner.

Achievement of these five key objectives will enhance the value of DSM for the customers of the current and future power grid.

[14] The December 30, 2015 Assigned Commissioner and Administrative Law Judge's Ruling Regarding High Opportunity Energy Efficiency Programs or Projects (HOPPs Ruling), at p. 20, states, "PAs may claim savings based on normalized metered energy consumption only on an ex post basis." D.16-08-019, at p. 108 (Conclusion of Law 79), affirmed the HOPPs Ruling.

III.

Portfolio Summary

A. Portfolio Overview, Vision, and Goals

1. Portfolio Overview

SCE continues to enhance its role as an EE PA through the delivery of a diverse, innovative, and cost-effective EE portfolio designed to meet the needs of our customers and the State of California's clean energy goals. SCE serves over 5 million customer accounts in an area of over 50,000 square miles in eastern and southern California. In 2015, SCE's EE programs collectively achieved over 1.5 billion kilowatt-hours (kWh) in annual energy savings and 300 megawatts (MW) of peak demand reduction. These savings are equivalent to the amount of power required annually for 226,000 standard residential homes and the emissions reductions is equivalent to the removal of 221,000 cars from the road.[15]

SCE's EE portfolio serves customers in all six of the sectors defined in D.15-10-028: Residential, Commercial, Industrial, Agricultural, Public, and Cross-Cutting. Figure 1 shows the percentage of SCE's total electricity consumption by each of the five customer-class sectors.[16]

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[15] The data shown here are from SCE's 2016 Energy Efficiency Annual Report and are based on SCE's *ex ante* savings, adjusted for actual installations, consistent with the *ex ante* values and processes adopted by the CPUC in D.11-07-030.

[16] Cross-cutting is a designation for EE programs and offerings, not a customer class.

Figure 1. SCE Electricity Use by Sector

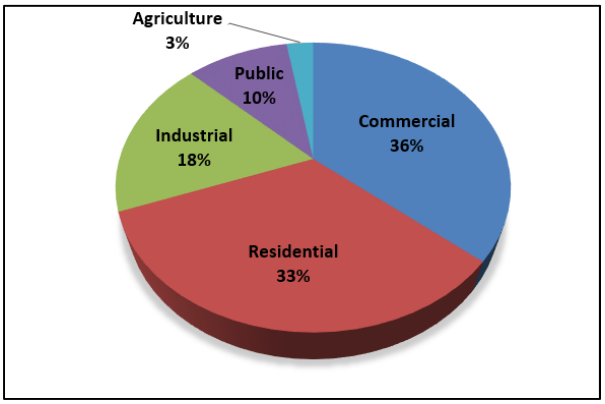

Table 1 shows the percentage of SCE's EE portfolio budget and the percentage of SCE's EE portfolio savings attributable to each sector. Table 1 shows seven sectors because Codes and Standards is shown apart from the rest of the Cross-Cutting sector.

Table 1. EE Budget and Savings by Sector

Sector	Percent of EE Portfolio Budget	Percent of EE Portfolio Savings
Residential	32%	30%
Commercial	38%	29%
Industrial	9%	8%
Agricultural	3%	3%
Public	9%	5%
Codes & Standards (C&S)	2%	25%
Cross-Cutting (w/o C&S)	7%	n/a

2. <u>Portfolio Vision</u>

SCE's vision for its EE portfolio from 2018 through 2025 is to continue to achieve cost-effective energy savings, expand innovative EE solutions, and drive toward market transformation. To realize this vision, SCE will employ several strategies across the portfolio.

To achieve cost-effective energy savings, SCE will aim to reduce costs and increase EE adoption by simplifying and streamlining offerings. This will include increased use of upstream and midstream offerings and self-service delivery channels. It will also entail reducing the number of customer touchpoints in certain sectors. SCE also plans to increase EE

adoption by providing customers with greater access to and understanding of their energy usage and expanded behavioral interventions. For non-residential customers, SCE plans to increase adoption and decrease costs by tailoring EE services based on customer energy usage and demand.

In terms of expanding the innovative solutions it offers to customers, SCE plans to increase the use of third-party providers and rely more on offerings designed by third-parties. SCE will also diversify its procurement for EE solutions by leveraging various DSM solicitations within its power procurement organization and by developing a new solicitation for third-party EE solutions. SCE will also use various pilots to test and learn about new technologies that have the potential to enhance EE on a broader scale in the future.

By increasing customer adoption of EE services and expanding innovation, SCE will continue to drive towards market transformation in the EE marketplace. SCE will also leverage cross-cutting portfolio resources, such as Codes & Standards (C&S), Workforce Education and Training (WE&T), and the Emerging Technology Program (ETP), to further enable market transformation activities, particularly in the residential sector. As SCE, with input from stakeholders, identifies particular sectors or market segments that have transformed, SCE will seek to reduce or eliminate relevant customer-funded programs.

3. Portfolio Goals

SCE's primary goal for its EE portfolio is to achieve the annual energy and demand savings goals identified in Table 2. These goals are the annual goals established in D.15-10-028.

Table 2. SCE's Annual Energy and Demand Savings Goals 2018-2024[17]

Year	2018	2019	2020	2021	2022	2023	2024
IOU Programs (GWh)	528	542	553	542	559	573	593
Net C&S (GWh)	421	414	393	337	304	262	247
Total Energy Savings (GWh)	949	955	946	879	863	835	840
IOU Programs (MW)	99	103	107	103	109	113	119
Net C&S (MW)	106	107	104	97	92	87	84
Total Demand Savings (MW)	206	210	211	201	201	200	203

The goals in Table 2 are based on Navigant's revised 2015 study of EE potential.[18] These goals will be "updated every other year, in sync with the CEC's IEPR demand forecast."[19] Because the last study was completed in 2015, the next study will occur in 2017, with a draft study released in May and the final study released, following a comment period, in time for an August final decision. Because the 2017 study is expected to modify SCE's savings goals, particularly for years beyond 2018, SCE's focus in this business plan is on achieving the 2018 goals. In addition to the savings goals, SCE has additional goals for particular sectors. These sector goals are described in the sector chapters.

When evaluating a PA's performance in meeting its EE goals, SCE recommends that the PA be able to count EE savings achieved through both its portfolio programs and RFO solicitations. EE Programs and RFO solicitations executed independently of the portfolio often compete for the same customers and resources. Vendors compete to obtain the same savings from the same customers. Any savings obtained through non-portfolio solicitations currently do not count toward the portfolio goals, but they are still EE savings achieved by the PA. Allowing PAs to count EE savings from all procurement methods supports California's ambitious EE goals.

[17] D.15-10-028, pp. 8-9.
[18] *Id.* at 6-7.
[19] *Id*. at 84.

B. Portfolio Drivers

The primary focus of SCE's EE portfolio is to achieve its energy and demand savings goals, but the portfolio is also shaped by several "drivers" -- various policies, market trends, and barriers. The goals set the target for the portfolio, but these drivers influence the goals and the means for meeting that target. This section describes the various drivers that affect SCE's EE portfolio. The individual sector chapters discuss any drivers that are specific to each sector.

1. Regulatory and Legislative Policies

When planning and developing its EE portfolio, SCE considers recent California regulatory and legislative policies. Table 3 identifies the important policies that shaped the development of SCE's EE portfolio proposals in this business plan.

Table 3. Key Regulatory and Legislative Policy Drivers

Policy	Goals / Requirements
California Long-Term EE Strategic Plan (CLTEESP)	• Presents a single roadmap to achieve maximum energy savings across all major groups and sectors in California • Requires all new construction, and 50 percent of existing buildings, to be zero net energy (ZNE) by 2030 (residential new construction by 2020) • In addition to ZNE, includes action plans for: Codes & Standards, Research and Technology, and Lighting. • Additional action plans in development for Industrial Sector and Local Government
Senate Bill (SB) 350 *(Clean Energy and Pollution Reduction Act of 2015)*	• Doubling of EE savings in the state's buildings by 2030 • Requires the California Energy Commission (CEC) to adopt a responsible contractor policy to ensure that customer-funded EE measures meet high quality performance standards and reduce energy savings lost due to poor quality workmanship • Addresses workforce development and job training in disadvantaged communities
Assembly Bill (AB) 802	• Authorizes IOUs to count all energy savings including for to-code measures • Authorizes IOUs to provide incentives based on NMEC as a measure of savings • Requires large, nonresidential, mixed-use, and multifamily buildings to disclose benchmarking data and for utilities to provide individual or aggregate whole-building energy usage data upon request for qualified buildings (implementation requirements currently under development at CEC)
AB 758 *(Comprehensive EE in Existing Buildings Law)*	• Requires the CEC to develop and implement a program to achieve cost-effective EE savings in existing state buildings that fall significantly below Title 24 standards
AB 793	• Requires IOUs to provide education on energy management technologies to residential and small / medium commercial customers and to provide incentives to acquire energy management technologies
Executive Order B-18-12	• Directs state agencies to reduce grid-based energy purchases for state-owned buildings by at least 20 percent by 2018 • Requires state-owned buildings to participate in demand response programs and use clean onsite power generation (if > 10,000 sq. ft.) • Requires state agencies to identify and pursue available financial and project delivery mechanisms to achieve these goals • Includes GHG abatement and ZNE goals for state buildings (ZNE by 2025)
Proposition 39 *(CA Clean Energy Jobs Act)*	• Provides funding to public schools to complete cost-effective clean energy project
AB 32 *(CA Global Warming Solutions Act)*	• Requires California to reduce its GHG emissions to 1990 levels by 2020 (later expanded to 40 percent below 1990 levels by 2030 by SB 32); plan to be implemented and developed by the California Air Resources Board (CARB) • Local governments define how they comply with the CARB's GHG emission reduction standards in Climate Action Plans
SB 1414	• Requires a customer or contractor to certify that an EE improvement or installation complies with any applicable specifications or requirements set forth in the California Building Standards Code in order to receive a rebate or incentive

2. General EE Market Trends

Several trends in the EE and DSM marketplace have shaped SCE's proposed portfolio. Table 4 identifies these market trend drivers that apply to the entire EE portfolio. Sector-specific trends are discussed in the sector chapters.

Table 4. General EE Market Trends

Trend	Description
Demand for Energy Management Technology (EMT)	Advances in digital consumer technology are driving consumer demand for new products and services to control their energy usage. Smart and distributed technologies — such as home energy management, distributed generation (DG), energy storage, mobile applications, and data-driven products and services — are rapidly coming to market and evolving quickly.
Access to Financing	Significant advances have been made in the residential financing market space using a Property Assessed Clean Energy (PACE) financing approach which allows homeowners to make energy- and water-efficiency improvements and to pay for them over time through their property tax bill. The program has grown to operate in 370 communities in California, within 37 counties and has helped 50,000 homes conserve 7.8 billion kWh of energy. In the nonresidential space, utility customer-funded financing programs have increased the use of financing for EE.
Reduced DG Costs	The declining cost and increased adoption of solar and battery storage is having a significant impact on the EE marketplace. Over the last six years, the price of solar photovoltaics has dropped dramatically, from an average cost of $7.50/watt in 2009 to less than $2.50/watt in 2015.[20] Additionally, the cost of lithium ion energy storage has dropped from $1250/kWh in 2009 to less than $225/kWh in 2013.[21]
Increased Third-Party Participation	New and improved technologies (e.g., energy management systems) have enabled new third parties to enter the market and increased opportunities to procure EE through third parties.
Targeted / Locational Offerings	With increased modernization of the grid and increased proliferation of DERs, there is a greater ability to offer targeted or locational incentives for EE. Local resource needs and local grid constraints are also driving increased need for DSM resources. In recent years, DSM has been leveraged to address resource constraints arising from events such as the closure of San Onofre Nuclear Generation Station (SONGS) and the natural gas storage leak at Aliso Canyon. For example, SCE's Preferred Resources Pilot is targeted to address the impact of high load growth in Orange County. Targeted load-reducing or load-shifting programs can also be used to shift demand into over-generation periods, thereby reducing the need to trigger other mitigation measures such as curtailing renewable generation.
Increased Data Availability and New Analytical Tools	There has been a proliferation of new data streams (e.g., energy usage via mobile apps, consumer "big data," etc.) coupled with new analytical tools. These new tools and data can potentially streamline and accelerate Emerging Technologies and support Measurement and Verification (M&V) approaches. Understanding new data streams and how to use them will allow utilities to achieve greater customer savings by developing new behavioral programs and/or augmenting existing ones. A host of new products in this area, such as EMT that intelligently optimizes a building's operations in real time, are showing early success in targeting customers and delivering savings.

3. Market Barriers

There are multiple barriers in the EE marketplace that may prevent potential customers from adopting EE measures. While there are some barriers that affect the entire

[20] Solar Energy Industries Association (SEIA), U.S. Solar Market Insight Report 2016 Q2, SEIA GTM Research, *available at* http://www.seia.org/research-resources/solar-market-insight-report-2016-q2.

[21] Sam Jaffe, *The Lithium Ion Battery Market Supply and Demand,* p.8, Navigant(Jan. 2014), *available at* https://www.arpa-e.energy.gov/sites/default/files/documents/files/Jaffe_RANGE_Kickoff_2014.pdf

portfolio, the barriers are largely specific to sectors. Therefore, barriers are described in the sector chapters.

C. Intervention Strategies

For 2018–2025, SCE plans to continue using many of the proven, successful intervention strategies it uses today while adding new strategies to enhance its portfolio. In some cases, SCE will modify existing strategies to increase their effectiveness. In this section, SCE describes the high-level strategies it proposes to employ in its EE portfolio. The sector chapters discuss which intervention strategies are used for each sector and how they are used to achieve goals.

Table 5 describes SCE's proposed intervention strategies for the 2018–2025 portfolio and identifies the sector chapters in which the strategies are discussed. The Cross-Cutting sector uses numerous additional strategies that are specific to the cross-cutting programs and they are not included in Table 5.

Table 5. SCE's Proposed Intervention Strategies

Strategy	Description	Sectors in which Strategies are discussed
Building Energy Benchmarking Data Access	Leverage customer data to benchmark facilities and provide a roadmap for EE retrofit opportunities; allow sub-metering costs to be included in project costs; identify solutions to help identify savings potential and manage energy use	Public
Community Data Access	Participate on Energy Data Access Committee (EDAC) to influence policy in order to make data more user-friendly to local governments (within Commission and California state law requirements for data privacy).	Public
Customer Data Access	Green Button "Download My Data" function for access to usage from individual accounts and Green Button "Connect My Data" function for customer to authorize SCE to send their energy usage and billing data to registered third parties	Public
Customer Incentives	Payments designed to encourage customers to adopt and install EE measures. Customer incentives will continue to be available to customers and will include incentives to comply with EE codes (i.e., "to code") and to go beyond codes (i.e., "above code").	Residential Commercial Industrial Agricultural Public
Delivery Channel	Identify and target specific delivery channels for EE products to reach specific hard-to-reach audiences and minimize free-ridership	Residential
Demonstration Projects	Demonstrate best practices and disseminate technical expertise in order to overcome knowledge gaps for market actors or industry	Residential
Direct Install / Turnkey	Access to Direct Install or Turnkey Programs allows customers to benefit because these programs remove technical and search burden by providing	Residential Public

Strategy	Description	Sectors in which Strategies are discussed
	vendors that have already been vetted and can be leveraged for customer touch points	
Financing	Designed to assist customers in acquiring the capital necessary to procure and install EE measures	Residential Commercial Industrial Agricultural Public
Integrated Customer Experience	Simplify the application and data access processes to allow customers with less programmatic knowledge to be able to participate in EE programs	Public
Intelligent Outreach	A targeted marketing approach using analytic tools to deliver specific messages to specific customer groups in order to increase EE adoption	Residential Commercial Industrial Agricultural
Midstream Incentives	Financial incentives directly to vendors or distributors to buy down cost and increase the sales of energy-efficient products	Residential Commercial Industrial Agricultural Public
Partnering	Identification and recruitment of key partners and market actors needed to support and reach various customer groups and drive adoption of EE	Residential Commercial Industrial Agricultural Public
Quality Assurance	Working with key market actors in order to improve EE products and services to meet industry specification and practices	Residential Commercial Industrial Agricultural
Rural & Disadvantaged Community Outreach	Leverage customer data to target core program coordination and outreach to rural and disadvantaged communities and relax certain program parameters that hinder rural and disadvantaged community participation	Public
Single Point of Contact	Streamline program offerings for market actors in order to reduce burden to participate in program offerings	Residential Commercial Industrial Agricultural
Small Business Outreach	Leverage Local Government Partnerships to market core programs (such as Direct Install) to small businesses in their community	Public
Strategic Energy Management	An organization-wide strategic energy management approach that sets long-term energy savings goals and uses rigorous tracking and reporting systems can drive greater savings, reach across entire building portfolios, and institutionalize such practices to sustain long-term savings	Commercial Industrial Agricultural Public
Strategic Plan Support	Assistance to public sector customers in developing policies, procedures, and codes that advance their pursuit of the Strategic Plan and other legislative sustainability mandates.	Public
Sustainable Offerings	Reduces intervention cost overhead or improves intervention cost-effectiveness	Commercial Industrial Agricultural
Technical Assistance	Professional assistance with EE project identification (e.g., audits and virtual audits), development, and management that will facilitate the implementation of EE and IDSM projects.	Public

Strategy	Description	Sectors in which Strategies are discussed
Third-Party Implemented	Solicitation for innovative third-party offerings	Public
Upstream Incentives	Financial incentives directly to manufacturers to buy down the cost and increase the sales of efficient products and reducing hassle for high volume products	Residential Commercial Industrial Agricultural Public
Water-Energy Nexus	Provide new technologies or processes to help water customers conserve energy; longer-term provide incentives for water savings	Public

D. Solicitation Approach

1. Background

D.16-08-019 requires each IOU PA to "outsource at least 20 percent of its program activity to third parties" and to propose in their Business Plans "a plan to transition to at least 60 percent of their portfolios to be outsourced to third parties" by the end of 2020.[22] To be designated as a third-party program, the program must be "proposed, designed, implemented, and delivered by non-utility personnel under contract to a utility program administrator."[23] To achieve this goal, SCE plans to leverage existing EE procurement methods and to introduce a new solicitation process.

2. SCE's Current Solicitations

SCE continues to assess and pursue new sourcing and delivery strategies in an effort to improve the cost-effectiveness of its EE offerings and to leverage innovative approaches offered by third parties. SCE has already used novel, market-based DSM procurement methods such as an "all source" LCR Request for Offers (RFO) solicitation. SCE also used market-based procurement for its PRP. These solicitations have validated SCE's ability to procure cost-effective preferred resources from third parties through market-based procurement mechanisms.

Within its EE portfolio, since 2008, SCE has reviewed over 300 abstracts or proposals from third parties for new program ideas and launched over 90 innovative programs.

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[22] D.16-08-019, p. 111.

[23] *Id.*

These programs came out of IDEEA365 and public solicitations. Since 2014, SCE has reviewed over 500 ideas and launched over 100 new measures or technologies and various pilots through the Proposal Evaluation & Proposal Management Application (PEPMA) process.[24] SCE also uses third parties for many "back office" functions in support of its EE programs. These include application review, inspections, and rebate processing. SCE will continue to explore expansion of these activities to reduce costs and improve customer satisfaction.

SCE is also using solicitations to procure energy storage and other preferred resources for the purpose of deferring distribution system upgrades. The Energy Storage and Distribution Deferral (ES&DD) RFO will occur in two tracks: (1) solicitation for Resource Adequacy from energy storage, and (2) all-source solicitation for electrical energy, capacity, and renewable attributes from eligible preferred resources for distribution deferral. Behind-the-meter EE will be part of Track 2, which will analyze whether DERs can effectively replace / defer traditional distribution system upgrades without a loss of system reliability. It will target five specific substations that accommodate various criteria to be tested, such as climate zone, customer type, and geographic diversity. The RFO was issued in December 2016 and delivery for Track 2 products will likely begin in 2018 or 2019.

3. SCE's Proposed EE Solicitation for Innovation

In preparation for 2018, SCE would like to begin an EE Solicitation for Innovation in the first quarter of 2017. SCE will solicit bids from third parties for program design and/or resource acquisition strategy proposals. SCE proposes to maintain an open solicitation and contracts are intended to be awarded in the first and third quarters of each year. The solicitation will remain open every year unless SCE determines that the total EE Portfolio budget has been fully allocated and will be under contract for an extended period of time. The solicitation will occur in two steps. In the initial round of solicitation, SCE will seek a broad spectrum of ideas in the form of abstracts. After reviewing these ideas, SCE will determine which options are viable.

[24] PEPMA is a website developed by the IOUs to enable EE administrators to post, receive, and evaluate requests for proposals (RFPs), requests for information, and requests for qualification.

The bidders with feasible options will then need to provide more detailed information, pricing, and cost-effectiveness analyses for a second round of scrutiny. SCE desires to begin the first solicitation under this process by the end of Q1 2017 with contracts expected to be signed by the end of Q3 2017. This proposed schedule for contracting offers the best prospect to complete solicitations and negotiations and allow for contractor ramp up in time to begin offering services on or about the first of every year (i.e., January 1, 2018 for the initial solicitation for innovation). SCE's bidding process is also intended to commence in waves with wave 1 focusing on third-party offerings and waves 2 and 3 focusing on support and engineering services, respectively. SCE cautions that this is a new process and therefore is subject to considerable variation based on the timing and nature of the bids received and the overarching focus on achieving Commission goals.

As discussed above, our preference is to conduct solicitations on an on annual basis and as needed. In their proposals, bidders will be expected to identify program designs and functions, expected deliverables, and sample metrics for monitoring program progress. SCE will generally expect bidders to use the following processes to support implementation (or provide sufficient justification for not including certain processes):

- Customer engagement (lead generation, marketing activities),
- Project submission (feasibility study, energy audits, defining baselines),
- Project review (technical review of project, which may include account and savings verifications),
- Project installation (equipment installation and permitting),
- Post evaluation (verification of savings and quality control), and
- Incentive payment (processing of incentives to customer, invoicing process).

Selection will be based on achieving balance among cost-effectiveness, EE goal achievement, and the requirement to transition at least 60 percent of SCE's EE portfolio budget to third parties by 2020. In addition, SCE will also be seeking innovative approaches for

delivering EE (for example, turnkey[25] and guaranteed pricing[26] or procurement style approaches). SCE will also expect proposals to identify how they will overcome market barriers, promote program participation, and minimize free ridership. If there are sectors for which SCE receives little to no interest, SCE will assess alternative solutions to achieve savings goals for those sectors. Alternative solutions could include more targeted solicitations for particular programs or programs implemented by SCE. Additionally SCE may select all or parts of proposals based on a third party's costs and/or capability to deliver certain functions.

Contract details are yet to be determined, but SCE anticipates the contract duration to be three years with an option to renew for an additional year on an annual basis, with a maximum of two additional years. After five years, the contract will be opened for new solicitations. All contracts will be subject to cancellation at any time for vendor failure to perform as required under the contract. Consistent with Commission preference, SCE plans to generally use contracts that are pay-for-performance, except for strategies, programs, or measures that cannot reasonably accommodate this contract type.[27] SCE will also aim to leverage strategies based on normalized metered energy consumption (NMEC) when possible. These are the target contract parameters, but SCE retains the flexibility to decide the length of contracts based on the contractor's past performance and results and other relevant factors.

4. Plan to Increase Third-Party EE

SCE plans to achieve transitioning at least 60 percent of its EE portfolio budget to third parties by establishing annual goals that it will strive to meet through the new Solicitation for Innovation process and other procurement processes. Table 6 shows SCE's annual percentage targets for EE budget to go to third parties. SCE recommends that it should be able

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[25] Programs using this structure typically offer complete products and services to move projects from assessment to installation.

[26] This procurement methodology is similar to the pay-for-performance approach except that winning bids commit to deliver savings at a guaranteed price within a predefined timeline. Implementers pay penalties in the event that they fail to deliver terms of the contract.

[27] D.16-08-019, p. 61.

to use portfolio budget for procurement of EE through alternative mechanisms that were not proposed and developed as part of the portfolio, such as the ES&DD RFO, and be able to count those procured resources when calculating the percentage of the portfolio outsourced to third parties. SCE should also be able to count savings procured through alternative mechanisms toward its EE savings goals. Consistent with D.16-08-019, programs administered under the new statewide model count toward a PA's third-party percentage goal.[28]

Table 6. SCE Third Party Sourcing Targets

Program Year	Percentage Goal Targets for EE Portfolio Budget to Third Parties
2018	20%
2019	40%
2020	60%

5. Peer Review Group / Independent Evaluator Proposal

D.16-08-019 stated the Commission "should look favorably on proposals for peer review groups or independent evaluators in the context of third-party selection."[29] The Commission was "inclined toward a structure similar to" one proposed by the Office of Ratepayer Advocates and the National Association of Energy Service Companies that recommended the "use of procurement review groups and/or independent evaluators such as those employed in supply-side solicitations by electric utilities under Commission oversight."[30] SCE recommends using the Procurement Review Group (PRG) and Independent Evaluators (IE) process currently used for its power procurement to also review solicitations and contracts for third-party EE programs. Using an existing review group is more efficient than starting a new group and it leverages the existing PRG's expertise in third-party solicitation and contract review.

[28] *Id.* at 94.
[29] D.16-08-019, COL 63, p. 106.
[30] *Id*, at. 75.

E. Statewide Administration Approach

1. Background

D.16-08-019 requires each IOU PA to include in their business plans "proposals for statewide programs and/or subprograms that comprise at least 25 percent of their portfolio budgets."[31] To be designated as a statewide program, the program must meet the following definition:[32]

> A program or subprogram that is designed to be delivered uniformly throughout the four large investor-owned utility service territories. Each statewide program and/or subprogram shall be consistent across territories and overseen by a single lead program administrator. One or more statewide implementers, under contract to the lead administrator, should design and deliver the program or subprogram. Local or regional variations in incentive levels, measure eligibility, or program interface are not generally permissible (except for measures that are weather dependent or when the program administrator has provided evidence that the default statewide customer interface is not successful in a particular location. Upstream (at the manufacturer level) and midstream (at the distributor or retailer level, but not the contractor or installer level) interventions are required to be delivered statewide. Some, but not all, downstream (at the customer level) approaches are also appropriate for statewide administration. Statewide programs are also designed to achieve market transformation.

In addition to requiring that all upstream and midstream programs be delivered under the new statewide model, D.16-08-019 requires the PAs to propose in the business plans "at least four downstream programs to be piloted on a statewide basis and shall include a proposed lead administrator and other program details."[33]

SCE collaborated with the other IOU PAs to develop a proposal for which PA should be the lead administrator for each statewide EE upstream and midstream program or subprogram. In some cases, the PAs recommend separate leads for different aspects of a program in order to take advantage of a particular PA's expertise, relationships, and other factors. The PAs also collaborated to determine a recommendation for which downstream programs should be used to pilot the new statewide approach. These proposals are discussed

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[31] *Id.*at 110.

[32] *Id.* at 109-110.

[33] *Id.* at 111.

further in the remainder of this section. They are also discussed in more detail in a whitepaper jointly developed by the IOU PAs titled "Statewide Administration Approach," which is attached as Exhibit 3 to SCE's Business Plan application. D.16-08-019 requires the PAs to "present, in their business plans, their approach for each of the above programs or subprograms to be delivered."[34] SCE has included details about the statewide programs for which it is the proposed lead administrator in the relevant sector chapters.

The PAs used six criteria to develop lead administrator recommendations:

- **Portfolio Approach and Natural Bundling** – Grouping of programs under a single lead administrator where there are opportunities for a cohesive strategy across multiple programs, including consideration of regional, climate, and locational resource constraints that could have a bearing on relationships with key market participants.
- **Cost-effectiveness** – Proven ability to deliver cost-effective savings for a program;
- **Capacity** – Capacity to deliver a particular program at a statewide level;
- **Expertise** – Expertise and knowledge in a particular area;
- **Relationships** – Whether a particular PA has existing strategic relationships that would be beneficial under statewide administration; and
- **Stakeholder Feedback** – Consideration of CAEECC stakeholder feedback.

2. Upstream and Midstream Programs

Table 7 identifies the PAs' recommended lead administrator assignments for all upstream and midstream programs and provides a high-level rationale for each recommendation.

[34] D.16-08-019, p. 64.

Table 7. Recommendation for Statewide Lead Administrators

Program	Lead Administrator Recommendation	Rationale
State Government Partnerships: State of CA; Dept. of Corrections	PG&E	Increased efficiency and economies of scale by bundling these under one administrator; PG&E has access to State Agency leadership
Financing (New Finance Offerings)	PG&E	PG&E has professional financing expertise and experience in implementing EE financing programs both in and out of California; demonstrated statewide leadership in finance programs for the last four years
Codes & Standards: Building Codes Advocacy and Appliance Standards Advocacy)	PG&E	Demonstrated leadership in these areas for over 10 years at both the state and federal level; engineering and strategic resources skilled in these areas; strong relationships with the statewide PAs, CEC, DOE, efficiency advocates, industry stakeholders, and CPUC staff
WE&T (K-12 Connections)	PG&E	Current statewide lead; expertise required to effectively engage educational communities; experience working with disadvantaged communities and organizations that serve disadvantaged workers
Electric ETP	SCE	Fuel-specific expertise; statewide lead for over 10 years; consistent commitment to ETP in terms of expertise, resources, and budget allocation and has successfully met or exceeded all program goals since the program's inception over 10 years ago
Lighting (Primary Lighting, Lighting Innovation, and Lighting Market Transformation)	SCE	SCE leads the state in energy savings claimed through the statewide primarily lighting programs and is the low-cost leader compared to the other IOUs on a $/kWh basis; SCE's upstream lighting approach concept has been replicated in other states
Commercial New Construction (Savings by Design (SBD))	SCE	The coupling of SBD and the ETP under SCE supports drive toward ZNE in the Commercial sector by 2030; grouping ETP, Primary Lighting, and SBD provides an end-to-end focus on lighting that begins with the evaluation of new lighting technologies and ends with code readiness through non-residential new construction; experience in administering SBD for over 18 years; top-two performer in terms of cost on a $/kWh basis
Government Institutional Partnerships (UC / CSU and CA Community Colleges)	SCE	Current statewide lead for the UC/CSU Partnership; low-cost leader in administering the UC/CSU Program and a leader in administering the CCC Program on a $/kWh basis; systems infrastructure necessary to support program administration at the statewide level, including unique online application capabilities
Residential New Construction	SoCalGas	Most cost-effective administrator of the Residential New Construction program, on a $/therm basis; demonstrated leadership in partnering with electric utilities to deliver programs that offer comprehensive energy solutions; demonstrated experience of successfully managing dual-fuel EE programs to customers coupled with the discipline on cost-effective implementation

Program	Lead Administrator Recommendation	Rationale
Gas ETP	SoCalGas	Fuel-specific expertise; close relationships with the California Energy Commission natural gas Public Interest Energy Research programs and the Gas Technology Institute
Upstream HVAC	SDG&E	Statewide Residential HVAC lead for nearly four years; experience collaborating with HVAC industry stakeholders to optimize the HVAC programs to increase customer comfort, improve air quality, reduce operating costs, and save energy for customers
Midstream Plug Load & Appliances (PLA)	SDG&E	In 2016, SDG&E redesigned the water and energy savings kit subprogram within the PLA program resulting in a 50 percent reduction in the cost of the kit and will leverage this experience to target similar efficiency gains on a statewide scale

3. Downstream Programs

The PAs recommend that the following four programs be piloted under the new statewide model: (1) WE&T Career and Workforce Readiness Program, (2) Water Infrastructure and System Efficiency (WISE), (3) Indoor Agricultural Program, and (4) Residential Contractor HVAC Quality Installation / Quality Maintenance Program. The recommended lead administrator and rationale are described in Table 8.

Table 8. Statewide Downstream Pilot Recommendations

Program	Lead Administrator Recommendation	Rationale
WE&T Career & Workforce Readiness Program	PG&E	PG&E has experience working with disadvantaged workers, and with organizations that serve disadvantaged workers and disadvantaged communities.
WISE	SCE	The WISE program was originally launched out of SCE's IDEEA 365 solicitation, was a pilot for approximately 18 months, and is now transitioning to a mainstream third party-implemented program. SCE's extensive experience with the WISE pilot will be useful for conducting the program on a statewide basis
Indoor Agricultural Program	PG&E	With indoor agriculture growing in popularity, PG&E is well-positioned to meet customer needs thanks to its experience in serving the agriculture community.
Residential Contractor HVAC QI / QM Program	SDG&E	In addition to SDG&E's experience in offering residential QI/QM programs within its portfolio, SDG&E has served as the lead for Statewide CALSPREE Residential HVAC QI/QM program since 2013 and is well positioned to conduct the program on a statewide basis.

4. Clarifications Regarding Statewide Administration

SCE recommends several clarifications related to the new statewide administration model. These recommendations, if adopted by the Commission, will improve SCE's ability to achieve the Commission's goals for statewide administration while also delivering a cost-effective portfolio that achieves SCE's portfolio goals. Specifically, SCE recommends the following:

- PAs should have the ability to opt out of statewide programs for cost-effectiveness or local reliability concerns,
- IOU PAs should be allowed to continue local pilot activities that would otherwise qualify for statewide administration but are not ready for statewide treatment.

a) Ability to Opt Out of Statewide Program or Subprogram Activities

D.16-08-019 states that "[c]osts and benefits would still be separately tested by utility service area, on behalf of ratepayers from whom the funds were collected."[35] However, it is not clear what options are available to individual PAs to modify or opt out of statewide programs or subprograms if the programs negatively affect the cost-effectiveness of the PA's portfolio. It is also unclear how a PA can modify a statewide program or subprogram in the event of a local reliability issue.[36] SCE supports the Commission's goals for statewide administration, but achieving that goal should not take priority over the PAs achieving their EE goals in a cost-effective manner or over grid reliability. The Commission should establish a process by which a PA can modify or opt out of that program if it is negatively affecting the PA's portfolio cost-effectiveness, hindering the PA's ability to meet energy and demand savings goals, or limiting the PA's ability to respond to a local reliability issue. SCE recommends that the Commission use existing rules in the EE Policy Manual for program modifications.

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[35] *Id.*at 55.

[36] For example, as a result of the recent reliability concerns associated with the Aliso Canyon Gas Storage facility, the Commission asked SCE to leverage its demand-side management programs, such as EE, to help alleviate reliability risks.

b) Pilot Activities Should be able to be Administered Locally Until They Are Ready for Statewide Administration

D.16-08-019 requires upstream and midstream interventions to be delivered statewide.[37] PAs may have pilots that are part of an upstream or midstream program or subprogram. Pilots are often implemented to test and evaluate the viability of more broadly introducing a program into the EE portfolio. PAs should retain the ability to launch and administer pilots on a local basis to determine whether it can be implemented on a statewide basis. The implementation of a local pilot for an existing statewide program would be done in coordination with the lead PA and other PAs that are part of the statewide program, but the PA implementing the pilot would be the administrator for the pilot. If the pilot results and input from the CAEECC validate that the pilot should transition into a program, the pilot would then convert to a statewide approach, with formal approval granted by the Commission via Advice Letter, per current practice.

F. Portfolio Budget

Pursuant to D.15-10-028, the budget presented in this business plan is high-level. The Annual Budget Advice Letter, to be filed on September 1, 2017 for the 2018 program year (PY), will provide a "more fully developed" budget based on budget expectations the Commission will establish in a decision adopting the business plans.[38] This budget is proposed for the Commission's consideration "at a general level" in order to provide additional guidance – it is not a request for funding authorization as the Commission will provide such authorization in response to the September 1 Annual Budget Advice Letter filings.[39] To provide PAs flexibility to adjust spending during the life of the business plan, the Commission required that the business plans only "provide *general* information on the expected levels of annual spending for the

[37] D.16-08-019, p.109 (OP5).
[38] D.15-10-028, p. 43.
[39] *Id.* at. 48.

duration of the business plan" and that the decision on the business plans "will establish a 'ballpark' figure for spending for the life of the business plan."[40] Therefore, SCE's proposed budget for its business plan provides "high-level budget estimates" rather than detailed estimates.

To determine its annual budget estimates for 2018-2025, SCE used its proposed budget from the 2017 Annual Budget Advice Letter as a baseline and scaled this budget relative to the annual energy savings estimates found in Table 9, below.[41] SCE's proposed budget for 2017 was $278.78 million, which was a decrease from the $333.32 million annual budget authorized in D.15-01-002 for 2015-2025. At the time of the filing of this business plan, SCE's 2017 proposed budget was not yet approved by the Commission.[42] If the Commission does not approve SCE's proposed 2017 budget, SCE would need to modify its 2018-2025 budgets accordingly. SCE anticipates that its average annual budget request will be approximately $271 million each year from 2018-2025.[43] The specific budget in the annual request will be influenced by several factors including, but not limited to:

- Policy changes, including measure baselines and eligibility,
- Changes in measure costs,
- Legislation,
- New state or federal building codes or appliance standards,
- Updated potential savings forecasts and associated goals, and
- Inclusion of non-energy benefits or additional changes to avoided costs

Table 9 shows SCE's actual portfolio expenditures for 2015, projected expenditures for 2016, proposed portfolio budget for 2017, and proposed portfolio budgets for each year of this

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[40] *Id.* at 55-56.

[41] The scaling process includes such activities as: moving incentives / costs from programs / measures with lower cost-effectiveness to ones with higher cost-effectiveness, added budget for expected new programs, adjusted non-direct implementation costs to account for transition of current third-party program contracts to new implementers, and removing measures that are proposed to sunset.

[42] SCE filed its 2017 budget in AL 3465-E. On September 22, Energy Division suspended the advice letter for Staff Review. SCE filed supplemental AL 3465-E-A on December 14 to make modifications and correct minor errors.

[43] $271 million is the average of the budgets for 2018 – 2025 in Table 9.

business plan (2018 – 2025). Budgets are presented in the standard EE categories of Administration, Marketing, Direct Implementation, Incentives, and EM&V. SCE's budget also includes the budget for the Southern California Regional Energy Network (SoCalREN).

Table 9. SCE's Proposed Annual EE Budget 2018-2025

PY	Administration ($000)	Marketing ($000)	Direct Implementation ($000)	Incentives ($000)	EM&V ($000)	SoCalREN ($000)	Total Portfolio Budget ($000)
2015[44]	$17,169	$6,670	$109,030	$155,925	$13,333	$15,547	$317,673
2016[45]	$15,469	$5,042	$103,981	$146,436	$13,333	$17,314	$301,575
2017[46]	$15,685	$3,506	$86,636	$144,538	$11,151	$17,262	$278,777
2018	$14,398	$3,265	$86,917	$114,584	$8,363	$17,262	$242,481
2019	$14,815	$3,363	$89,370	$118,022	$8,614	$17,262	$257,049
2020	$15,101	$3,430	$91,054	$120,382	$8,787	$17,262	$269,830
2021	$14,809	$3,361	$89,336	$117,975	$9,050	$17,262	$265,331
2022	$15,238	$3,462	$91,861	$121,514	$9,322	$17,262	$272,604
2023	$15,680	$3,566	$94,463	$125,159	$9,601	$17,262	$280,094
2024	$16,135	$3,673	$97,142	$128,914	$9,889	$17,262	$287,809
2025	$16,604	$3,783	$99,902	$132,781	$10,186	$17,262	$295,756

SCE's EE accounting practices conform with D.09-09-047, which requires that administrative costs be capped at 10 percent of the total budget; marketing, education, and outreach (ME&O) costs have a target of six percent of the budget; non-incentive direct implementation costs have a target of 20 percent of the total budget; and EM&V funding is capped at four percent of the authorized budget.[47] In addition, The Utility Audit, Finance and Compliance Branch of the Commission conducted an audit of SCE's 2014 EE program year activity with no significant findings, thus demonstrating SCE's compliance with the Commission's accounting directives.[48]

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[44] Actual expenditures.

[45] Projected expenditures; expenditures are projected for 2016 because savings and expenditures will not be finalized until SCE submits its EE Annual Report on June 1, 2017.

[46] This is the budget SCE proposed in AL 3465-E.

[47] D.09-09-047, p.354 and p. 369.

[48] Financial, Management, Regulatory, and Compliance Examination Report on Southern California Edison Company's Energy Efficiency (EE) Program For the Period January 1, 2014 through December 31, 2014.

D.12-04-045 required, and D.14-01-004 later affirmed, that after 2012, future authority and funding for the DR portion of all Integrated DSM (IDSM) activities should be proposed and approved in the EE proceeding.[49] The funding for EE aspects of IDSM is included in the EE portfolio budget in Table 9 (and the relevant sector-level budgets). Table 10 shows SCE's proposed budget for DR aspects of IDSM for each year of the business plan (including actual DR IDSM expenditures for 2015, projected DR IDSM expenditures for 2016, and proposed DR IDSM budget for 2017). IDSM strategies are discussed in various sections of this document and specific details about IDSM will be included in Implementation Plans at the appropriate time.

Table 10. SCE's Proposed Annual DR IDSM Budget 2018-2025

Program Year	Total DR IDSM Budget ($000)
2015[50]	$3,065
2016[51]	$11,746
2017[52]	$10,137
2018	$8,780
2019	$9,360
2020	$9,871
2021	$9,678
2022	$9,961
2023	$10,253
2024	$10,554
2025	$10,864

G. Portfolio Savings

Table 11 shows SCE's savings forecast for its EE portfolio for 2018 through 2025 (including claimed savings for 2015 and projected savings for 2016 and 2017). These forecasts include savings for SoCalREN and SCE's Energy Savings Assistance (ESA) program. Savings

[49] D.14-01-004, p. 12.

[50] Actual expenditures.

[51] Projected expenditures; expenditures are projected for 2016 because savings and expenditures will not be finalized until SCE submits its EE Annual Report on June 1, 2017.

[52] This is the budget SCE proposed in AL 3465-E.

forecasts for individual sectors can be found in the respective sector chapters. Appendix C includes a table showing all of the elements of the savings forecasts.

Table 11. SCE's EE Portfolio Savings Forecast 2018-2025[53,54]

Program Year	Total kWh Portfolio Savings	Total kW Portfolio Savings
2015[55]	1,494,018,584	258,877
2016[56]	1,319,775,449	269,339
2017[57]	1,409,599,931	279,650
2018	991,623,854	259,949
2019	1,025,899,878	276,475
2020	1,040,961,380	287,816
2021	968,465,452	276,932
2022	951,253,266	277,000
2023	924,903,359	277,226
2024	928,099,514	279,693
2025	955,942,500	288,084

H. Portfolio Cost-Effectiveness

SCE calculated the cost-effectiveness for its proposed EE portfolio for program years 2018-2020. SCE did not calculate the cost-effectiveness for the remaining years of the time period covered by the business plan because little is known about what changes might affect portfolio cost-effectiveness beyond 2020. Table 12 shows the forecasted Total Resource Cost (TRC) and Program Administrator Cost (PAC) cost-effectiveness calculations for SCE's portfolio for 2018-2020. The Cost-Effectiveness Tool (CET) output Excel spreadsheets are included in Appendix D.

53 2015-2016 Savings are shows for historical purposes.

54 Energy savings reflect gross savings except for the savings from Codes & Standards, which are net savings.

55 Claimed savings.

56 Projected savings.

57 Projected savings.

Table 12. SCE EE Portfolio Cost-Effectiveness Forecast 2018-2020

Program Year	TRC	PAC
2018	1.01	1.97
2019	1.04	1.98
2020	1.08	2.01

I. Portfolio Performance Metrics

D.15-10-028 requires the PAs to include in their business plans "[p]ortfolio and sector level metrics for regulatory oversight (GWh, MW, therms, cost-effectiveness, and other metrics where applicable), including performance metrics for non-resource programs."[58] The metrics are to be used by the Commission, the PAs, and stakeholders to "gauge portfolio and/or program performance."[59] Metrics for SCE's resource programs focus on energy savings while the metrics for non-resource, cross-cutting programs support relevant strategic plan directives.

For tracking portfolio progress and performance, SCE will use the following metrics:

- Energy Consumption (GWh) and Demand (MW) Savings
- Portfolio Cost-Effectiveness (TRC and PAC)
- GHG Emissions

SCE proposes to report the savings and cost-effectiveness portfolio metrics in its monthly EE Report and the GHG emissions annually.

SCE proposes sector-level metrics in the individual sector chapters of the business plan. These metrics can be used to track the sector's progress towards the overall objectives and sector-level goals. Because the business plan focuses on intervention strategies, rather than specific programs, the sector-level metrics are intended to measure progress against the outcomes the strategies aim to achieve.

Program-level metrics, which will be more granular than sector-level metrics, will be included in Implementation Plans.[60] Program-level metrics will be based on SCE's approved

[58] D.15-10-028, p. 47.
[59] *Id*. p. 52.
[60] *Id*., p. 53.

business plan and specific program approaches and implementation strategies that will be determined by SCE and third-party program designers and implementers. Program-level metrics enable SCE to establish metrics appropriate for specific programs that might be conflicting at the sector level. For example, a strategy to increase participation rates in a particular program, such as an online audit too, by reaching a wider audience may result in lower per-customer savings, while for other programs may focus on increased savings depth and target smaller segments of specific customers with high potential for savings. Therefore, SCE has not established targets for metrics such as participation rate or energy savings per customer. However, SCE recognizes the value of including additional tracking metrics to examine the cumulative effect of the implementation plans on sector-level energy savings. In addition, the data collected via these tracking efforts may provide a basis to establish targets in the future to assess program performance against implementation plans for that given sector.

J. Integration with Other DSM Activities

The Business Plan Guidance document requested this section in each sector chapter. However, SCE found that these sections were largely repetitive across different sectors and elected to consolidate it into the Portfolio Summary chapter.

1. Demand Response (DR)

Through the efforts of the Emerging Markets Technology Program, SCE has contributed to successful integration of demand response (DR) with innovative EE programs and services such as the Statewide Emerging Technologies Program,[61] the Zero Net Energy (ZNE) pilots, intelligent energy buildings software analysis, and communications protocols for "Smart" EE systems and devices across customer sectors. This is in alignment with the Commission policy of integrated demand-side management (IDSM), which integrates demand-side programs and technologies to achieve maximum benefits while avoiding duplicative efforts and reducing customer confusion. Integrating EE and DR enables SCE to be more efficient, for example by

[61] Many of the EM&T project reports are posted on the Emerging Technologies Coordinating Council website and *available at* http://www.etcc-ca.com/

conducting one site visit to identify opportunities for both EE and DR and by marketing EE and DR together in one campaign rather than separately, which enables cost reductions. Integrating the two programs also helps customers better understand peak load and opportunities to reduce their usage because SCE can present one vision that includes more efficient equipment combined with controls that allow the customer to participate in DR and the positive effects the combination of EE and DR can have on their bill.

In addition, many EE technologies that are being developed in the marketplace lack the effective channels and protocols to communicate with grid services, limiting their ability to be coordinated and dispatched. One of the tenets of the IDSM strategy is to provide comprehensive building energy management solutions via the integration of technologies, programs, and software to facilitate customer behavior changes that reduce impacts to the grid. The Emerging Markets Technology Program works with vendors, technologists, and software providers to develop open standards and building codes so that consumer goods, facilities, and energy systems are both energy efficient and "DR ready".

An example of such a program is the Commercial HVAC Quality Maintenance Program which provides incentive upgrades to rooftop unit digital controls to enhance economizer functionality. The advanced digital economizer controls (ADEC) provide a platform for additional capabilities, such as DR.[62] Transformative Wave Technologies' Catalyst is one example of the ADEC products qualified in CQM that can be modified with DR capability. SCE is also considering offering an EE incentive associated with smart thermostats beginning in 2017.[63] This incentive will align with SCE"s existing DR incentive for smart thermostats, known as Save Power Day Incentive.[64]

The Public sector generally supports participation in DR programs. However, many Public sector entities cannot participate in DR programs because their facilities are

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[62] DR is not currently incentivized in the Commercial Quality Maintenance (CQM) program.

[63] The ability to offer a smart thermostat EE incentive is pending workpaper approval.

[64] SCE provides an incentive of $1.25 per kWh saved during a DR event. SCE also offers a rebate for the purchase of a qualifying smart thermostat.

"Essential Use" facilities (such as hospitals and correctional facilities), because buildings are not in use during DR program windows, or because other state or federal laws prohibit their participation (such as educational facilities). Public sector entities are also highly risk-averse, with a desire that any program in which they participate will deliver benefits with no possible negative repercussions for non-performance. Certain DR programs depend on participation and payment for non-performance, which does not align with the goals of many Public sector profiles.

In the Local Government (LG) segment of the Public sector, Local Government Partnership (LGPs) have made DR participation one of the requirements for LG advancement within the Energy Leader Partnerships' tier model. DR participation can include installing automated DR technologies so that the LGs are "DR ready." LGs also facilitate AB 793 by serving as examples to their communities in the adoption of automated DR systems. Also in the LG segment, SCE offers integrated audits that look for both EE and DR opportunities. This is accomplished by a single site visit followed by an audit report presented to the customer to explain each identified opportunity.

2. <u>Residential Rate Reform</u>

In 2015, the Commission approved D.15-07-001 to reform residential electric rates and directed the IOUs to prepare for the future transition of residential customers to Time-of-Use (TOU) rates. As part of the transition, the IOUs are required to study specific topics through a Default TOU Pilot, including systems operability, default TOU rate design, and customer communication and messaging to drive acceptance of TOU rates and load shifting.[65] On December 16, 2016, SCE filed AL3531-E to propose its Default TOU Pilot for residential customers.[66] SCE will leverage lessons learned from the Default TOU Pilot to prepare for the full transition of all eligible residential customers to a TOU rate.

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[65] D.15-07-001, p.170.

[66] AL3531-E is pending Commission approval.

The Default TOU Pilot proposes a robust marketing plan that focuses on educating customers about TOU and providing customers with tools and solutions to help shift or reduce usage during on-peak periods while on a TOU rate. Tools available to customers include program information related to EE, DR, energy management systems (EMS), SCE's Home Energy Advisor Tool, and a bill comparison tool.[67] The bill comparison tool allows customers with 12 months of interval data to view their monthly historical usage costs compared with costs associated with available TOU rates.[68] This tool is currently available to customers online and allows customers to request a rate change within the tool.[69] Marketing plans developed to support the Default TOU Pilot aim to make the transition to residential TOU as seamless as possible, and to encourage customers to remain on TOU rates and reduce load during TOU peak periods.

In addition, to support the residential transition to TOU rates, SCE filed AL 3500-E to outline its ME&O plans for residential TOU rates. In that filing, SCE noted that its residential TOU ME&O plan will leverage a variety of message integration opportunities and techniques from existing programs in EE, DR, distributed generation (DG), low-income customer support, and Climate Credit communications.[70] Examples of such messaging are "Important Information About Your Energy Use", "Switch to energy-saving LED lighting," and "Install SMART programmable thermostats." SCE's residential TOU ME&O plans are designed to be aligned with EE program messaging and this alignment is incorporated into a residential TOU ME&O metric.[71] Additionally, SCE will employ a timeline and strategy on when and how customers are contacted regarding TOU rate changes. For example, SCE will communicate directly to customers who are at risk of being affected by the High Usage Charge

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[67] AL3531-E, pp.59-62.

[68] An enhanced tool will be available to customers Q1 2018.

[69] AL 3531-E, p 62.

[70] AL 3500-E, Attachment A, p.5

[71] *Id.* at 60. ME&O Goal #5 reads "Customers are aware of the rebates, energy efficiency programs, and tips offered by their utility that can help them manage their energy bill."

(HUC) and recommend mitigation tools to help reduce negative bill impacts.[72] Customers who will be neutrally impacted or who are "structural winners" will be encouraged to "Opt-In" to a TOU rate because they will benefit or experience no change.[73]

In addition to efforts underway in the Default TOU Pilot and Residential TOU ME&O, SCE's residential EE programs are designed to enable customers to reduce their energy use during peak and off-peak TOU periods. The strategies and tactics laid out for customer offerings are evaluated using a cost-effectiveness metric designed to save energy at the most costly times of delivery. SCE's Residential EE and DR Programs encourage customers to reduce and defer overall energy usage, which may translate to savings during higher cost TOU periods.

3. Integrated Demand-Side Resources (IDSRs)

Most of the Commission's policy decisions and guidance regarding IDSRs are coming out of the Distribution Resources Plan (DRP) (R.14-08-013) and Integrated Distributed Energy Resources (IDER) (R.14-10-003) proceedings. Outcomes in the IRP-LTPP proceeding (R.16-02-007) will also provide guidance related to IDSRs. As guidance and requirements come out of these proceedings, SCE will modify its DSM portfolios, including EE, as necessary to support the Commission's IDSR policies. During the time period covered by this business plan, SCE anticipates issuing solicitations for DSM resources that may include IDSRs.

4. Zero Emission Vehicles

The Emerging Technologies Program (ETP) works to support the conversion of the transportation sector away from petroleum to electric and alternative fuel vehicles. The ETP has collaborated with the Codes & Standards (C&S) Program to understand the charging infrastructure for electric vehicle (EVs), with the eventual goal of delivering effective energy management options through advanced controls that will facilitate time-of-need charging.

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[72] *Id.* at 4.
[73] *Id.*

5. Energy Savings Assistance (ESA) Multi-Family Focused

Since 2014, SCE has been simplifying its program delivery approaches and aligning its MF EE offerings with ESA offerings. SCE provided an extensive proposal to integrate program design and delivery for MF property owners and low-income ESA Program participants in the low-income proceeding.[74] The purpose of this integration was to address a multitude of program offerings available to the MF segment which had varying income qualifications, often a source of confusion for MF property owners and managers and individual tenants. Feedback from stakeholders and EM&V indicated the desire for a single point-of-contact to help MF property owners and managers access appropriate programs and resources to meet their needs. SCE discusses the single point-of-contact approach in the Residential sector chapter of this business plan (Chapter III, Section D.3.b).

In D.16-11-022, the Commission directed extensive coordination of the ESA program with other proceedings, including the direction to better integrate EE On-Bill Financing Options and On-Bill Repayment with ESA program[75] and "to provide funding and coordinate with the Program Administrators well-positioned multi-family programs to deliver deep energy retrofits specific to low income multi-family housing."[76] The Commission authorized $18 million in ESA program funds towards the MF sector. SCE is currently developing its plans to implement the directions from this Decision.

In 2013-2014, the Commission approved the implementation of the Middle Income Direct Install (MIDI) Pilot as a sub-program to Energy Upgrade California. The MIDI pilot was designed to coordinate with SCE and SoCalGas' ESA Programs and offer a subset of ESA measures to income-qualified customers. The pilot program experienced very low program enrollment for a variety of reasons, including constrained measure offering, inconsistent concentrations of income-eligible customers, and/or willingness of customers to provide income

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[74] SCE Application (A.) 14-11-007.
[75] D.16-11-022, OP 51
[76] D.16-11-022, p.209.

documentation. The Residential Direct Install (Res-DI) Program incorporates these lessons learned, resulting in a scalable, cost-effective program that supports several local and state initiatives.

IV.

Residential Sector

A. Residential Sector Vision and Goals

SCE's vision for the Residential sector is to increase customer adoption of residential EE measures, enhance customer knowledge of energy-saving actions, and target EE market participants to maintain cost-effectiveness. SCE uses a coordinated approach to educate residential customers about EE opportunities, such as influencing the purchase and installation of energy efficient equipment and through behavioral changes. SCE empowers customers to realize the value of EE through simplified offerings that connect appropriate products, services, or solutions that are customized for customer needs and enable continuous energy management. To realize this vision, SCE will use five key strategies:

1. Enable third parties to promote cost-effective solutions.
2. Simplify EE offerings by increasing the utilization of upstream, midstream, and self-service delivery channels and by reducing the number of customer touchpoints.
3. Expand customer engagement opportunities as a result of increased customer awareness of and access to their consumption data.
4. Expand behavioral interventions to enable deeper adoption of EE.
5. Leverage alternative cross-cutting portfolio resources to enable market transformation activities across the residential sector.

SCE's primary goal for the Residential Sector is to achieve 171.33 GWh in electric energy savings and 64.7 MW in demand savings in 2018. Table 13 shows SCE's annual savings forecasts for the Residential sector through 2025 (including claimed savings for 2015 and projected savings for 2016 and 2017). These forecasts are based on the overall portfolio goals from D.15-10-028. As explained in the Portfolio Summary chapter, they will be updated in 2017.

Table 13. SCE's EE Residential Sector Savings Forecast 2018-2025

Program Year	Total kWh Sector Savings	Total kW Sector Savings
2015[77]	452,402,078	36,627
2016[78]	283,305,940	53,308
2017[79]	349,456,319	83,627
2018	202,863,704	88,755
2019	234,533,592	102,420
2020	265,533,592	115,634
2021	259,881,776	113,321
2022	267,678,229	116,721
2023	275,708,576	120,222
2024	283,979,833	123,829
2025	292,499,228	127,544

B. Residential Market Characterization

SCE's Residential sector consists of approximately 4.4 million service accounts, includes approximately 14 million people, and spans eight climate zones. Residential accounts represent 87 percent of SCE's total service account volume. In 2015, residential customers used approximately 33 percent (26,730 GWh) of the total electricity consumption in SCE's service territory. Also in 2015, SCE's Residential sector represented 32 percent of the total EE portfolio budget and achieved 30 percent of the portfolio's GWh savings. The Residential sector is one of the largest sectors in terms of usage, budget, and savings, and can provide some of the key savings opportunities for SCE's EE portfolio.

1. Customer Landscape

a) Segments and End Uses

There are three customer segments within the Residential sector: single-family (SF),[80] multifamily (MF), and mobile homes. SF is the largest segment, consisting of

[77] Claimed savings.

[78] Projected savings.

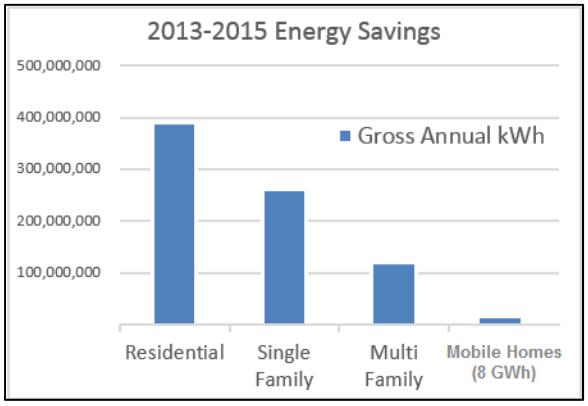
[79] Projected savings.

[80] The SF market generally refers to buildings with four or fewer dwelling units. *See* California Existing Buildings Energy Efficiency Action Plan, p. 11 (Sept. 2015), *available at* http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-05/TN206015_20150904T153548_Existing_Buildings_Energy_Efficiency_Action_Plan.pdf.

approximately 63 percent of SCE's total Residential customer volume and 73 percent of the Residential energy usage. MF is the second largest segment, consisting of approximately 22 percent of the total Residential customer volume. Mobile homes are the smallest segment, consisting of approximately 5 percent of SCE's Residential customer volume.

SF units typically have higher energy usage than their MF counterparts while mobile homes have an energy consumption pattern that falls between the two.[81] As shown in Figure 2, from 2013-2015, SF units accounted for 67 percent (261 GWh) of the total Residential gross energy savings. MF and mobiles homes accounted for 31 percent (120 GWh) and two percent (8 GWh), respectively.

Figure 2. 2013-2015 Energy Savings Gross Annual kWh by Type of Home[82]



While the size of the property influences these comparative energy consumption patterns, a primary driver affecting the EE of a building is the age of the home. In SCE's territory, as of 2012, approximately 41 percent of residential homes were constructed prior to 1970, which is four years prior to the advent of Title 24 Codes and Standards in 1974. Building age can help SCE to target energy savings opportunities associated with these older, inefficient buildings.

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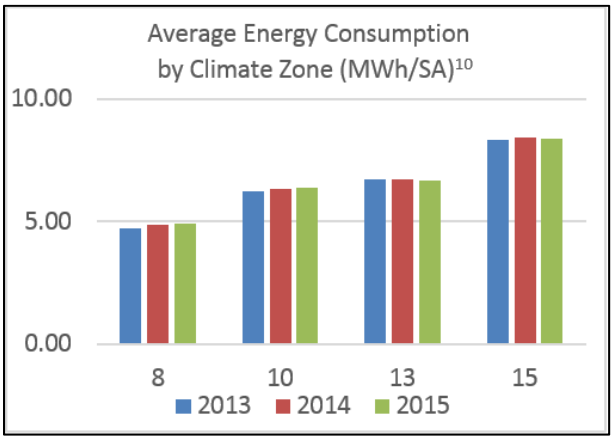
[81] *See* KEMA, Inc., 2009 California Residential Appliance Saturation Study Executive Summary, Figure ES-5 at p.8 (Oct. 2010), *available at* https://webtools.dnvgl.com/RASS2009/Uploads/2009_RASS_ExecSummary_FINAL_101310.pdf.

[82] Data generated using features from California Energy Efficiency Statistics website *available at* http://eestats.cpuc.ca.gov/Views/Documents.aspx.

Within SCE's territory, climate zones (CZ) are a primary factor associated with customers' energy use and are critical when evaluating energy savings options. Energy consumption may be due to necessity (e.g., air conditioning (AC), larger home, more occupants, etc.) rather than energy usage inefficiencies. Figure 3 shows that homes within Climate Zone 15, which has extremely hot and dry summers, use more than 8,000 kWh, while homes within Climate Zone 8, which has temperatures that are less extreme, use less than 5,000 kWh per year.

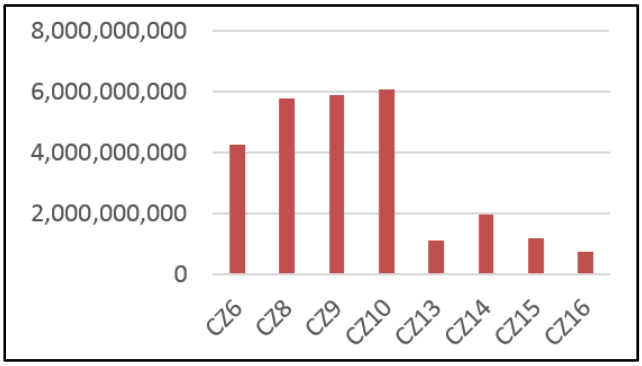
Figure 3. Average Energy Consumption by Climate Zone[83]



SCE's Residential energy consumption is concentrated in four climate zones, as shown in Figure 4. The majority of residential customers reside within CZ 8 (Inland Coastal), CZ 9 (Inland Valley), and CZ 10 and consumed more than 65 percent of the total residential electrical usage.

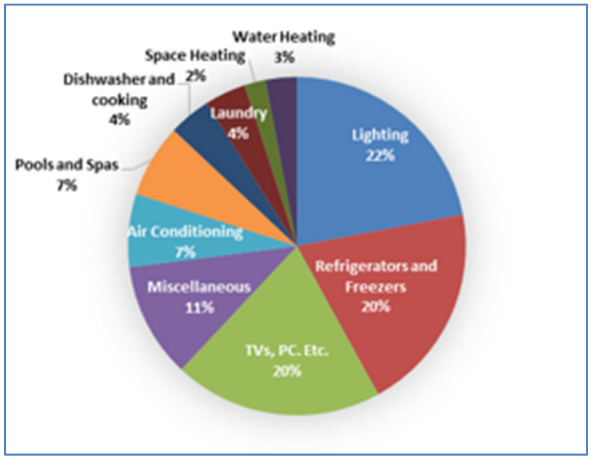
[83] Data from SCE's internal Customer Service System (CSS).

Figure 4. Residential Electricity Usage by Climate Zone[84]



Residential energy usage has a variety of end uses. Figure 5 displays the electricity usage in the Residential sector in California by end use. Approximately 62 percent of the electricity usage in the Residential sector is for Lighting; Refrigerators and Freezers; and TVs, PCs, etc.

Figure 5. Statewide Electricity Consumption Per Household[85]



b) Customer Types

There are three types of EE decision-makers in the Residential sector: (1) homeowners and renters, (2) MF property owners and managers, and (3) new construction builders and developers. Homeowners and renters, and MF property owners and managers, are generally involved in retrofitting EE activities, while builders and developers participate in new

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[84] *Id.*

[85] KEMA, Inc., 2009 California Residential Appliance Saturation Study Executive Summary, Figure ES-1 at p. 3 (Oct. 2010), *available at* https://webtools.dnvgl.com/RASS2009/Uploads/2009_RASS_ExecSummary_FINAL_101310.pdf.

construction EE activities. SCE typically targets SF homeowners and MF building owners for retrofits and it targets SF homeowners and renters for energy management, behavioral strategies, and EE strategies inside the home.

(1) Homeowners and Renters

Achieving deep energy savings in the homeowner and renter market is challenging because of the tremendous diversity in house type and size, customer socioeconomic status, customer awareness of EE, and climate zones. In addition, it is challenging to incentivize the renter market to make significant EE investments. Whether a customer rents or owns their home affects their willingness to make EE improvements that benefit the building owner rather than the person living in the home. Approximately 42 percent of Residential customers in California rent their homes.[86]

(2) MF Property Owners and Managers

The MF sector has many challenges and opportunities that are unique to this "hard-to-reach" market.[87] One of these challenges is the "split-incentive" barrier in which the residents are not the owners of the property, so they lack incentive to undertake EE projects to improve their energy usage. The variety of building type (e.g., high rise, garden style, etc.) and ownership types (e.g. affordable, market-rate, etc.) is another major challenge to successfully transforming this complex market. Buildings are commonly characterized by size, regardless of whether they are owned or rented, or whether rents are market-rate or subsidized. Occupants of individual dwelling units function as a SF home for the tenant, but MF properties

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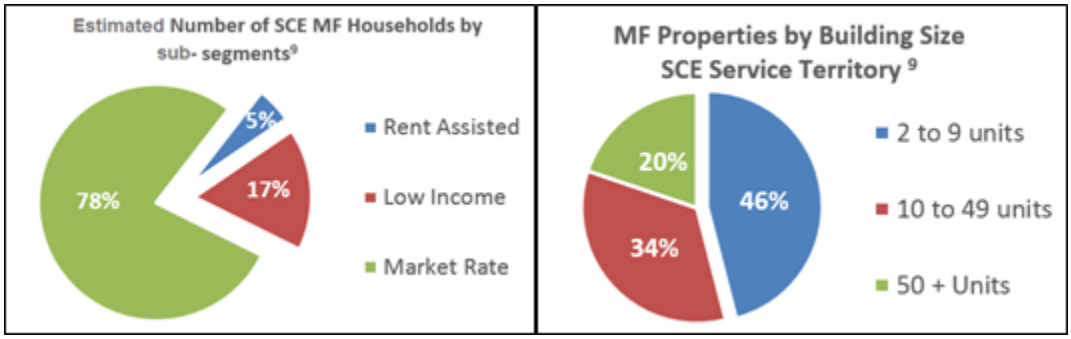
[86] KEMA, Inc., Final Report WO21: Residential On-site Study: California Lighting and Appliance Saturation Study (Class 2012), Table 17, IOU Electric Territories at p. 3-19, *available at* http://www.calmac.org/publications/2014.11_24_WO21_CLASS_Final_Report_Clean.pdf.

[87] The CPUC EE Policy Manual defines hard-to-reach customers in the Residential sector as "Those customers who do not have easy access to program information or generally do not participate in energy efficiency programs due to a language, income, housing type, geographic, or home ownership (split incentives) barrier." *See* http://docs.cpuc.ca.gov/word_pdf/agenda_decision/11164.pdf *at* p. 12.

are essentially commercial investments for owners and operators. MF buildings can be regulated under both commercial and residential building codes depending on the property size.[88]

EE is one of multiple investment decisions for MF property owners. There are typically three key factors that should be considered when offering EE programs and services to MF property owners and managers: (1) number of units in a property, (2) number of properties in a particular owner / operator's portfolio, and (3) rental rates (i.e., market rate, low-income, or rent-assisted). Figure 6 shows the percentage of MF households in SCE's territory that have different rental rates. Figure 7 shows the percentage of MF properties in SCE's territory by building size (in terms of number of units).

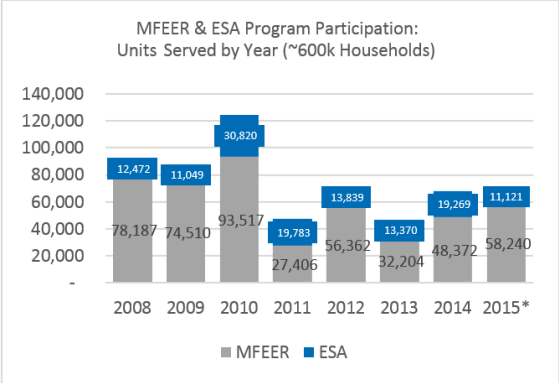
Figure 6. SCE MF Households by Rental Rate and Building Size



EE is a relatively low priority for MF property owners because they have many demands on their resources. This is demonstrated by the modest program participation depicted in Figure 7 for the Multifamily Energy Efficiency Rebate (MFEER) and Energy Savings Assistance (ESA) Programs.

[88] *See* California Existing Buildings Energy Efficiency Action Plan, p. 15 (Sept. 2015) *available at* http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-05/TN206015_20150904T153548_Existing_Buildings_Energy_Efficiency_Action_Plan.pdf.

Figure 7. MFEER & ESA Program Participation 2008-2015



(3) New Construction Builders and Developers

The majority of EE spending in the Residential sector is focused on existing buildings. However, there are several trends in the marketplace for new construction that warrant continued emphasis and focus on new construction builders and developers. These trends are discussed further in Section C.2 of this chapter.

2. Residential EE Potential

Based on the 2015 California EE Potential Study (Potential Study), SCE has an achievable potential energy savings of approximately 135 GWh, and an achievable demand savings of approximately 27 MW, for the Residential sector in 2018.[89] The achievable energy and demand savings gradually decrease to approximately 130 GWh and 16 MW, respectively, by 2024.[90] Appendix E shows the energy and demand savings market potential for SCE, by sector, for 2017-2026.

The Residential sector end uses with the greatest energy savings potential are Lighting, Appliances, and Whole Building. Recent changes from the Potential Study and *AB 802 Technical Analysis*[91] view on historical EE savings shows an increase in HVAC potential

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[89] Navigant Consulting, Energy Efficiency Potential and Goals Study for 2015 and Beyond, Sept. 2015, *available at* http://www.cpuc.ca.gov/General.aspx?id=2013.

[90] *Id.*

[91] *See* Navigant Consulting, AB 802 Technical Analysis Potential Savings Analysis, p. 54-55 (Mar. 2016), *available at* http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M159/K986/159986262.PDF.

due to modeling changes and an increased adoption of to-code systems as well as an increase in the Service Hot Water end use.[92] Navigant's analysis also shows that SCE's efforts in HVAC should focus on capturing stranded potential[93] and not on capturing savings through the regular turnover of equipment in the market.

The Potential Study shows a near-term decrease in Residential sector market potential.[94] One of the factors contributing to the decrease is the changes in codes and standards. For example, the CEC lamp standards,[95] such as "minimum efficiency standards" and "voluntary specifications", and the U.S. Department of Energy (DOE) lamp standards have contributed to less claimable energy savings for residential programmatic attribution. Additional factors include the recent decrease in avoided costs realized by EE[96] and a significant decrease in claimable savings associated with Appliance Recycling measures, which is a major contributing factor to the Plug Load and Appliance end-use potential.[97]

Changes that have a lesser known impact on the 2018 Residential Sector market potential include recent policy and market trends such as adjusting the potential goals to an existing conditions baseline, allowing to-code measures, including opportunities for further Behavioral, Retro-commissioning and Operational Activities, enabling energy management technologies, and pay-for-performance approaches.

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[92] *Id.*

[93] *Id.* at 59 (defining stranded potential as "capturing the savings from old equipment beyond its useful life").

[94] Navigant Consulting, Energy Efficiency Potential and Goals Study for 2015 and Beyond, Sept. 2015, *available at* http://www.cpuc.ca.gov/General.aspx?id=2013.

[95] AB 1109 designates a specific efficacy for lighting products which is a primary contribution in the decrease in the market potential of SCE's programs, as the savings potential will be attributed to C&S instead of program influences.

[96] Brian Horii et al., Avoided Costs: 2016 Interim Update, (2016), *available at* http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=12504.

[97] KEMA, Inc., Appliance Recycling Program Impact Evaluation Volume 1: Report Work Order 35(Oct. 2014), *available at* http://www.calmac.org/publications/2010-2012_ARP_Impact_Evaluation_Final_Report.pdf.

C. Residential Sector Drivers

This section describes the drivers in the Residential sector that shape the landscape of EE beyond the sector's market characteristics and trends. SCE describes various regulatory and legislative drivers, residential sector market trends, barriers and challenges, and results of EM&V studies in this section.

1. Regulatory and Legislative Drivers

The policy drivers for the Residential sector are largely the same as the general portfolio drivers described in the Portfolio Summary chapter (Section III.B.1).

In addition, the California Long Term Energy Efficiency Strategic Plan (CLTEESP) identifies the following goals for the Residential sector:

- New construction will reach ZNE performance (including clean, onsite DG) for all new single and multifamily homes by 2020.
- Home buyers, owners, and renovators will implement a whole house approach to energy consumption that will guide their purchase and use of existing and new homes, home equipment (e.g., HVAC systems), household appliances, lighting, and plug load amenities.
- Plug loads will be managed by developing consumer electronics and appliances that use less energy and provide tools to enable customers to understand and manage their energy demand.
- The residential lighting industry will undergo substantial transformation through the deployment of high-efficiency and high-performance lighting technologies, supported by state and national codes and standards.
- 100 percent of MF homes to have 40 percent reduction in purchased energy from 2008 level.

2. Residential Sector Market Trends

The Portfolio Summary chapter (Section III.B.2) describes the market trends applicable to all of the sectors in the EE portfolio. This section addresses market trends specific to the Residential sector.

While increased access to financing is a general trend for the EE marketplace, there are some aspects that specifically affect the Residential sector. Significant advances have been made in the residential financing market space using a Property Assessed Clean Energy (PACE) financing approach, which allows homeowners to make energy and water-efficiency improvements and to pay for them over time through their property tax bill. According to Renovate America, financer of the Home Energy Renovation Opportunity (HERO) program, the program has grown to operate in 370 communities, within 37 counties, in California and has helped 50,000 homes conserve 7.8 billion kWh of energy.[98]

Changes in the new construction housing market show an increased focus on meeting housing needs through the MF space. As shown in Figure 8, since 2011 MF development is occurring at a higher rate than SF development. This type of development will likely serve renters rather than owners.[99] This trend has impacts other than identifying areas of EE opportunity within the New Construction space. The increase in MF housing may increase pressures on existing utility infrastructure and require new solutions for meeting ZNE.

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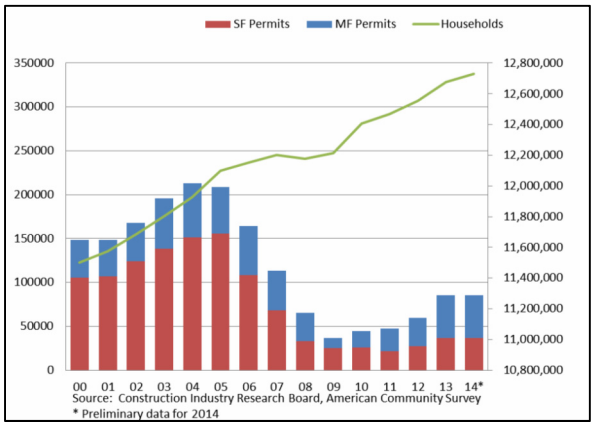
[98] Renovate America, California HERO Program Creates 10,000 New Jobs by Upgrading 50,000 Homes with Energy and Water Savings Products (Jan. 26, 2016), PRNewswire, *available at* http://www.prnewswire.com/news-releases/california-hero-program-creates-10000-new-jobs-by-upgrading-50000-homes-with-energy-and-water-savings-products-300209918.html.

[99] State of California 2015-2020 Federal Consolidated Plan, p. 50 (July 2015), *available at* http://www.hcd.ca.gov/housing-policy-development/housing-resource-center/reports/fed/docs/state-of-ca-2015-2020-conplan-final.pdf.

Figure 8. SF vs. MF Building Permits in California 2000-2014[100]



The largest electrical end uses within a home are plug loads at 40 percent, lighting at 22 percent, and HVAC at nearly 10 percent.[101] Consumption is not always indicative of potential for energy savings, but it can be used to guide investigation of opportunities. Regardless of the type of home ownership, and despite previous EE efforts, the residential plug load market continues to drive energy consumption in the Residential sector. While certain measures in the plug load space have realized significant EE savings, miscellaneous plug loads are still a concern.[102]

New HVAC unit sales in the Residential sector are highly efficient units; however, permit rates are still low for new units and existing efficiency potential in the market resides largely in older HVAC units and their proper installation and maintenance.[103] The residential HVAC market has seen 16 percent increases in average efficiency in the market place, but 42 percent of homes with central A/C systems still have a home with a Seasonal

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[100] *Id.*

[101] *See* KEMA, Inc., 2009 California Residential Appliance Saturation Study Executive Summary, p. 3 (Oct. 2010), *available at* https://webtools.dnvgl.com/RASS2009/Uploads/2009_RASS_ExecSummary_FINAL_101310.pdf

[102] *See* Sameer Kwatra, Jennifer Amann & Harvey Sachs, Miscellaneous Energy Loads in Buildings (June 2013), *available at* http://aceee.org/sites/default/files/publications/researchreports/a133.pdf.

[103] Navigant Consulting, AB 802 Technical Analysis Potential Savings Analysis, *available at* http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M159/K986/159986262.PDF.

Energy Efficiency Rating (SEER)[104] rating less than 12.[105] Nearly 50 percent of homes with central A/C have a unit more than nine years old and 28 percent have a unit more than 3 years old.[106] The average age of central A/C units increased from 11 years in 2010 to 15 years in 2012, while space cooling systems are newer than in previous studies.[107]

The lighting market in the Residential sector has been rapidly changing over the past ten years through advancements in technology, such as the introduction of Compact Fluorescent Lamps (CFLs) and then Light Emitting Diodes (LEDs), and through increases in codes and standards specifications. Primary considerations in determining the market maturation for a particular lighting product include saturation of the technology types, adoption rates for the technology, and the technology price point. In many cases, CFLs and LEDs are competing technologies aimed at driving efficiency over more traditional lighting solutions. A recent study titled "Lighting Savings Overlap Estimate for 2014 IOU Home Energy Report Programs" demonstrated a few significant Lighting market characterizations as well as trends within the end use itself, including:[108]

- Within California, CFL shares have decreased, while halogen shares have increased
- Consumers are purchasing more LEDs in 2014 than 2012, and
- Incandescent lamps continue to be available in California and in the U.S., and purchased by California customers, despite new lighting requirements.

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[104] SEER indicates the relative amount of energy needed to provide a specific cooling output.

[105] *See* KEMA, Inc., Final Report WO21: Residential On-Site Study: California Lighting and Appliance Saturation Study, pp. 2-17-2-20, *available at* http://www.calmac.org/publications/2014.11_24_WO21_CLASS_Final_Report_Clean.pdf.

[106] *Id*.

[107] *Id*.

[108] Marian Goebes et al., Lighting Savings Overlap Estimates for 2014 IOU Home Energy Report Programs, p. 11 (June 2016), *available at* http://www.calmac.org/publications/Final_HER_2014_Upstream_Lighting_Savings_Overlap.pdf.

An additional challenge for lighting in the Residential sector is maintaining high-efficacy lamps on shelves in particular retail channels. For example, high-efficacy lamps comprised over 50 percent of lamps on shelves in discount and grocery stores in 2012, but only 16 percent in discount stores and 29 percent in grocery stores in 2014.[109] LEDs have realized an increase in market share and have experienced significant declines in cost, 16 percent per year, supporting their uptake according to a Navigant study.[110] These characterizations and trends in the marketplace demonstrate that progress has been realized in the lighting sector but will face significant changes post-2017 with impending legislation, new efficacy standards, and the attribution of savings being shifted to Codes & Standards.

It has become increasingly difficult to maintain cost-effectiveness and support portfolio energy savings goals in the Residential sector. Figure 9 shows that between 2010 and 2014, both the TRC and GWh savings for SCE's Residential sector have declined significantly. Newer challenges include code impacts taking place in 2017 that will diminish energy savings in Residential New Construction and in 2018 for Primary Lighting. Responses to these challenges have occurred through retiring offerings such as refrigerator rebates and ending programs such as the Appliance Recycling Program and the Business Consumer Electronic (BCE) Program, which have been shown to transform the market and to no longer be cost-effective for program delivery.

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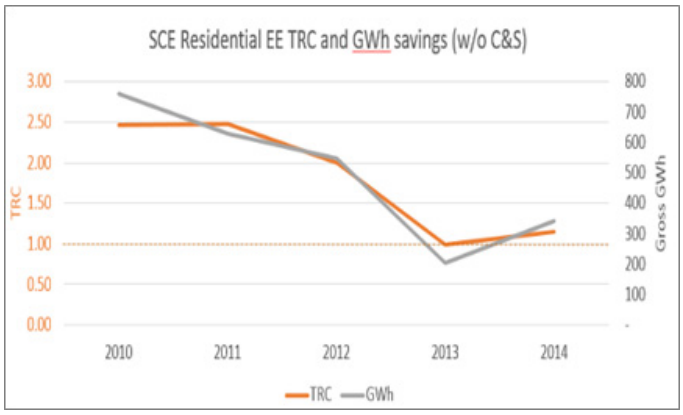
[109] *Id.* at 40. *See* Navigant Consulting, Inc., California LED Workpaper Update Study., at p. 1-4 (2015), *available at* www.calmac.org/startDownload.asp?Name=LED_Study_Report_FINAL_201510029

[110] *See* Navigant Consulting, California LED Workpaper Update Study, p. 1-4 (Aug. 2015), *available at* http://www.calmac.org/startDownload.asp?Name=LED_Study_Report_FINAL_201510029.pdf&Size=2871KB.

Figure 9. SCE's Residential Sector Energy Savings and Cost-Effectiveness 2010-2014[111]



3. Residential Sector Barriers

There are several barriers specific to the Residential sector that have influenced SCE's EE portfolio proposals. Table 14 describes these barriers.

Table 14. Residential Sector Barriers

Decision-Maker	Residential Barriers	
Homeowners / Renters	Hassle or transaction costs: [112, 113]	High implementation cost of energy upgrades and assessments; limited affordability of these projects.
		Lack of awareness associated with non-energy benefits of projects.
	Performance uncertainties	Performance uncertainty of EE benefits (financing limitations, realized savings).[114,115]

[111] Data generated using information from California Energy Efficiency Statistics website *available at* http://eestats.cpuc.ca.gov/Views/Documents.aspx

[112] *See* KEMA, Inc., Final Report: Baseline Characterization Market Effects Study of Investor-Owned Utility Whole House Retrofit Programs in California, p.10 (July 2014), *available at* http://www.calmac.org/publications/2014_DNV_GL_Whole_House_Market_Effects_Study_Final.pdf.

[113] *See* DNV-GL, Whole House Retrofit Impact Evaluation of Energy Upgrade California Programs Work Order 46, p. 75 (Oct. 2014), *available at* http://www.calmac.org/publications/CPUC_WO46_Final_Report.pdf.

[114] *See* KEMA, Inc., Final Report: Baseline Characterization Market Effects Study of Investor-Owned Utility Whole House Retrofit Programs in California, p.34 (July 2014), *available at* http://www.calmac.org/publications/2014_DNV_GL_Whole_House_Market_Effects_Study_Final.pdf.

[115] Navigant Consulting, A Comprehensive Strategic Market Transformation (SMT) Plan for a Home Upgrade Program SMT Initiative Report on Working Group Activities from April 2014 through March 2015, p. 37 (June 2016), *available at*

Decision-Maker	Residential Barriers	
		Lack of awareness of EE and EE offerings by contractors.[116]
		High transactional cost for retailers to administer downstream rebates to consumers for plug loads and appliances.[117]
		Lack of retail sales staff and knowledge about EE products may not drive selection of high-efficiency plug load products.
		Lack of customer understanding of high quality products for lighting products.
	Asymmetric information and opportunism	Limited skilled workforce able to provide whole home solutions outside of their area of expertise.
	Misplaced or Split incentives	Residential property owners lack the financial incentive to make improvements to a tenant occupied property.
MF Building Owner / Facilities Manager[118]	Hassle and search cost	Tenant disruptions are usually discouraged by owners. Property owners typically discourage projects that disrupt occupancy and rental income thus often making EE upgrades not a worthwhile investment
	Access to investment capital and sufficient return on investment	Building owners must come up with money to initially invest in EE and return on investment takes time.
	Split incentives	Building owners are responsible for investing in EE improvements, while tenants reap benefits of lower energy bills.
	Performance uncertainty of EE benefits	Before investing, it is hard for building owners to predict the full return on EE investments which limits adoption of EE measures by facility owners and managers.

http://www.calmac.org/publications/A_Comprehensive_Strategic_Market_Transformation_Plan_for_a_Home_Upgrade_Market_Transformation_Initiative.pdf.

[116] *See* KEMA, Inc., Final Report: Baseline Characterization Market Effects Study of Investor-Owned Utility Whole House Retrofit Programs in California, pp. 8-9 (July 2014), *available at* http://www.calmac.org/publications/2014_DNV_GL_Whole_House_Market_Effects_Study_Final.pdf.

[117] *See* KEMA, Inc., Impact Evaluation Report Business and Consumer Electronics Program (WO34), *available at* http://calmac.org/publications/WO34_BCE_Impact_Evaluation_Report_-_Phase_1_FINAL_2013-04-15.pdf.

[118] Examples of ACEEE multi-family reports: Anne McKibbin et al., Engaging as Partners in Energy Efficiency: Multifamily Housing and Utilities, (Jan. 2012), *available at* http://www.aceee.org/research-report/a122.; Anne McKibbin & CNT Energy, Engaging as Partners: Introducing Utilities to the Energy Efficiency Needs of Multifamily Buildings and Their Owners, (Mar. 2013), *available at* http://www.aceee.org/research-report/e137; Kate Johnson, Apartment Hunters: Programs Searching for Energy Savings in Multifamily Buildings, (Dec. 2013), *available at* http://www.aceee.org/research-report/e13n.

Decision-Maker	Residential Barriers	
	Strategic investment versus replacement at burn-out	Replacement at burn-out of equipment is more prevalent than strategic EE business investment policies amongst property owners
	Lack of knowledge and low EE priority	EE is a relatively low priority for MF building owners who, like all businesses, have many demands on their resources.
Builders and Developers[119]	Performance uncertainty of EE benefits	Incremental costs (to builders) reduces the number of builders that deliver ZNE-type homes through programs.
		Lack of Consumer Demand: Lack of homebuyer demand for ZNE-type homes.
	Lack of knowledge	Education and training needs
		Building officials' training needs, to allow for permitting high-performance homes without delay.

Based on these barriers, SCE developed problem statements for the Residential sector that it will aim to address with its EE portfolio. These problem statements are the following:

Homeowners / Renters

- Low Unit Energy Savings (UES) and high transactional costs are reducing the value of traditional downstream approaches to market transformation activities for mass market and mainstream technologies.
- Increasingly stringent codes and standards for residential lighting products will affect savings opportunities and require support for market adoption of high-quality, high-efficiency products.
- Deep, holistic, and quality home retrofits have high costs compared to the expected energy savings, making the current whole home upgrade program design challenging for customers and not cost-effective.
- Customers need engagement tools to drive continuous and persistent behavior change and program participation.

[119] *See* TRC Energy Services, Residential ZNE Market Characterization (Feb. 2015), *available at* http://www.calmac.org/publications/TRC_Res_ZNE_MC_Final_Report_CALMAC_PGE0351.01.pdf .

MF Building Owners and Facility Managers

- Participants in the MF sector are fragmented and diverse, creating challenges in aligning drivers for increased EE adoption.

Builders / Developers

- The costs associated with marginal increases in above-code savings for new construction are reducing savings and increasing the complexity of market code compliance.

4. Residential Sector Challenges

There are several approaches to capturing market-achievable potential that are not currently achieving cost-effective energy savings and may be discontinued. For example, in the 2013-2015 portfolio, specific programs had TRC values of less than 0.15, including Home Upgrade California and Residential HVAC.[120] Other offerings, such as Residential New Construction, are facing similar challenges due to code changes taking place in 2016. In 2018, Primary Lighting will face similar issues.

In addition, as Title 24 building code becomes more stringent, there will be less attributable EE savings for programs to capture. By 2020, the California New Construction market will follow new Codes and Standards subject to the CEC's test for cost-effectiveness. As building codes and standards improve, programs will be challenged to remain cost effective from year to year. However, there are still many possible program interventions, including improving the value proposition of ZNE-qualified homes and providing tools for new builders, that can be implemented to support market needs and help transform this market.

5. Lessons Learned from Past Cycles and EM&V Studies

Results of several Residential sector evaluation studies provide further insight on sector trends and provide recommendations that will inform SCE's future approach to

[120] SCE Energy Upgrade California (SCE-13-SW-001D) and Residential HVAC (SCE-13-001E) Programs. Data generated using information from CPUC, California Energy Efficiency Statistics Portal, 2013-2015 Program Cycle: http://eestats.cpuc.ca.gov/Views/EEDataPortal.aspx Filtered for SCE (Energy Upgrade California and Residential HVAC).

maintaining a cost-effective EE portfolio and enhancing the effectiveness of its engagement approaches. Appendix F includes a broad list of EM&V summaries and recommendations SCE will leverage to develop and implement its EE programs in 2018-2015. Key evaluation takeaways SCE leveraged to develop its portfolio include the following:

- Market actors in the MF sector are fragmented and diverse, which creates challenges for increasing EE adoption. In addition, the MF sector can be considered hard-to-reach and may benefit from the following:
  - Simplify program offerings through program administration modifications (e.g., implementing a Single Point of Contact), and
  - Provide tools and resources to enable facility managers and building owners to understand the value of EE.
- Deep, holistic, and quality home retrofits have high costs relative to expected energy savings, which makes the current design challenging for customers. Residential programs, especially Home Upgrade or retrofit programs, could improve their gross realization and net realization rates by focusing on the following:
  - Target customers to drive deeper EE savings by focusing on specific attributes (e.g., high Energy Use Intensity)[121]
  - Improve energy savings estimates and associated savings claims,[122] and
  - Continue focus on driving contractors' and technicians' awareness and adoption of industry standards, Air Conditioning Contractors of America

[121] DNV-GL, Whole House Retrofit Impact Evaluation of Energy Upgrade California Programs Work Order 46, p. 76 (2014), *available at h*ttp://www.calmac.org/publications/CPUC_WO46_Final_Report.pdf.

[122] DNV-GL, Focused Impact Evaluation of the 2013-2014 Home Upgrade Program, p. 25 (May 2016), *available at* http://calmac.org/publications/CPUC_HUP_Focused_Evaluation-FINAL_05-03-16atr.pdf. 0118.01, pp. 24-25

(ACCA) 5[123] and 9 standards, which provide minimum design, installation and verification requirements for residential HVAC applications.[124]

- Residential lighting has made progress encouraging the adoption of high efficiency lighting such as LEDs but will face changes in upcoming program cycles as codes and standards move to Energy Star® specifications and other compliance requirements:
  - LEDs have realized an increase in market share and have experienced significant declines in cost (16 percent per year),[125] and
  - Consumers purchased more LEDs in 2014 than in 2012.[126]
- Targeted, larger measures, such as refrigerators, within the plug load and appliances space have seen improvements.[127] However, to curtail plug load consumption growth, stakeholders need to identify product categories where sales can be influenced by retailer decisions about the merchandise they stock and promote for smaller plug load devices.[128] This is proven by recent California Lighting and Appliance Saturation Survey (CLASS) study results.

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[123] ANSI/ACCA Standard 5, Air Conditioning Contractors of America, January 2015.

[124] Energy Market Innovations, California HVAC Contractor & Technician Behavior Study (Sept. 2012), *available at* http://www.calmac.org/publications/CA_HVAC_Behavior_Study_FinalReport_2012Sept14_FINAL.pdf; Ellen Steiner & Donna Whitsett, California HVAC Contractor & Technician Behavior Study, Phase II (Apr. 2015) *available at* http://www.calmac.org/publications/HVAC_C%26T_Behavior_Phase2_FINAL_REPORT.pdf.

[125] Navigant Consulting, California LED Workpaper Update Study, p. 1-4 (Aug. 2015), *available at* http://www.calmac.org/startDownload.asp?Name=LED_Study_Report_FINAL_201510029.pdf&Size=2871KB.

[126] Marian Goebes et al., Lighting Savings Overlap Estimates for 2014 IOU Home Energy Report Programs, p. 39 (June 2016), *available at* http://www.calmac.org/publications/Final_HER_2014_Upstream_Lighting_Savings_Overlap.pdf.

[127] KEMA, Inc., Final Report WO21: Residential On-site Study: California Lighting and Appliance Saturation Study (CLASS 2012), p. 2-12 *available at* http://www.calmac.org/publications/2014.11_24_WO21_CLASS_Final_Report_Clean.pdf.

[128] KEMA, Inc., Impact Evaluation Report: Business and Consumer Electronics Program (WO34), p.6-35 (Apr. 2013), *available at* http://calmac.org/publications/WO34_BCE_Impact_Evaluation_Report_-_Phase_1_FINAL_2013-04-15.pdf.

SCE plans to take a more focused market transformation approach to this class of measures.

- Residential new construction interventions must continue to drive awareness and adoption of industry standards (i.e., Title 24 requirements, modelling, and best practices) among builders and developers.

D. SCE's Approach to Achieving Sector Goals

SCE has developed its Residential sector EE portfolio to accommodate the drivers, recognize the market trends, and address the barriers and challenges described above in order to meet the sector goals. This section describes the Residential sector portfolio approach.

1. Sector Strategy Overview

SCE's approach to the diverse nature of the Residential sector is to tailor solutions based on customer segment (SF, MF, or mobile home) and customer type (homeowner, renter, MF owner / manager, builder / developer). SCE and its partners will provide solutions to guide customers to meet their energy management needs and provide a means for continuous engagement, education, and expertise to help drive deeper EE savings. To do this cost-effectively, SCE will deploy new tools, enable market participants, and streamline offerings. This strategy will support the state's goals of reaching energy savings targets, reducing GHG emissions, and supporting customer needs.

In order to achieve its vision for the Residential sector, SCE will increase customer engagement and enablement through behavioral and program offerings. This will include a more cost-effective approach for customers performing retrofits by pursing new approaches such as meter-based, pay-for-performance, and residential direct install offerings. These adjustments will require targeted investment and the scaling back of other historical approaches. To drive forward the changes needed in the Residential sector, SCE will employ the following overarching strategies to enhance the current portfolio:

Strategy 1: Enable Third Parties to Promote Cost-Effective Solutions

- Support and encourage third-party program proposal, design, and delivery

- Develop RFOs for third-party solicitation based on market and portfolio needs, and
- Enable market-based solutions utilizing customer energy consumption data while preserving customer privacy.

Strategy 2: Simplify Offerings

- Simplify offerings by increasing the utilization of upstream, midstream, and self-service delivery channels
- Consolidate customer touchpoints to simplify processes
- Reduce and/or eliminate non-cost-effective programs
- Statewide Administration of midstream and upstream programs
- Shift from downstream to alternative delivery channel paths, and
- Connect customers to products and authorized contractors (delivery channels).

Strategy 3: Expand and Explore New Customer Engagement Based on Energy Usage.

- Customize outreach to customers to be more relevant
- Drive consumers to self-service channels, and
- Use benchmarking services.

Strategy 4: Expand Behavioral Interventions to Enable Deeper EE Adoption

- Use energy management technologies
- Influence customers through more traditional behavioral interventions, and
- Promote continuous energy management and engagement.

Strategy 5: Leverage Alternatives

- Leverage alternative cross-cutting portfolio resources to enable market transformation activities across the Residential sector
- Leverage WE&T to provide training and education for market actors
- Demonstrate market-ready solutions and pathways for emerging technologies and practices, and

- Leverage C&S to deliver mature market intervention solutions.

2. Existing Products and Services

In the 2018-2025 portfolio, SCE plans to make changes to the following programs or transition them to statewide administration or third-party implementers.

Energy Advisor Program: The Energy Advisor subprogram will use interactive tools designed to engage customers and encourage participation in innovative initiatives. These initiatives are designed to help customers understand and manager their energy use, and will guide them, where appropriate, towards advancing whole-house energy solutions.

Plug Load and Appliances (PLA): The existing PLA subprogram merged the previous Home Energy Efficiency Rebate (HEER), Business Consumer Electronics (BCE), and Appliance Recycling subprograms. BCE and Appliance Recycling have since been discontinued. This subprogram will develop and build upon existing retailer relationships and continue to modify its approach and product mix to improve cost-effectiveness and goal achievement. PLA will transition to a statewide midstream subprogram and the IOU PAs have proposed that SDG&E be the lead PA.

Multifamily Energy Efficiency Rebate Program (MFEER): The MFEER subprogram will promote EE by providing equipment rebates to owners and tenants of MF properties, including common areas of residential apartment buildings, condominium complexes, and mobile home parks. SCE will integrate the MFEER direct install and Energy Savings Assistance (ESA) Program's MF efforts to better support the needs of low-income tenants in SF and MF properties.

Comprehensive Manufactured Homes: The target customers may include a wide range of people who are typically of moderate or fixed income, and may be elderly, retired, or disabled. It is designed to enhance customers' EE knowledge and program participation.

Primary Lighting Program: The Primary Lighting Program engages lighting manufacturers to enroll in the program and to supply retailers with energy-efficient lighting products. These products are then sold to customers at a reduced price. An incentive

reimbursement is paid to the manufacturer which, at its own expense, facilitated the discounted rate. One hundred percent of the incentive is passed on to the customer, making Primary Lighting a "pass-through" incentive program, which is one form of an upstream program.

SCE is the proposed lead PA for the statewide Primary Lighting Program, which is an upstream program. Statewide administration is expected to proceed starting January 1, 2018. Program Details will be included in the Implementation Plan.

Lighting Market Transformation (LMT) and Lighting Innovation (LI):[129] The LMT subprogram is the process through which the IOUs develop and test market transformation strategies for emerging lighting technologies. The LI subprogram identifies lighting measures that could potentially progress into the Primary Lighting Program.

SCE is the proposed lead PA for statewide administration of the LMT and LI programs. Statewide administration is expected to begin on January 1, 2018. Program Details will be included in the Implementation Plan.

Residential New Construction Program (RNC):[130] The statewide RNC subprogram consists of only one program, California Advanced Homes (CAHP). In Southern California, the program helped guide builders to produce efficient homes in a cost-effective manner. It will be modified to examine methodologies for supporting the Strategic Plan target of residential ZNE by 2020. RNC will transition to a statewide subprogram and the IOU PAs have proposed that SoCalGas be the lead PA.

Energy Upgrade California Home Upgrade: This subprogram is designed to increase customer and contractor awareness of the house-as-a-system approach to residential retrofits and of the many benefits of improving the comfort, safety, and energy savings potential of a house. The Home Upgrade approach promotes both Basic and Advanced Paths to retrofitting. These complementary paths are presented to customers as one comprehensive offering. Due to implementation and project costs associated with this program, alternative

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[129] Changes pending 2017 Advice Letter Filing 3465-E.
[130] *Id.*

approaches are being investigated such as a pay-for performance structure to continue to support comprehensive retrofit efforts.

Residential HVAC Program:[131] The Residential HVAC subprogram's primary objective was to improve California's HVAC market in technology, equipment, installation, and maintenance. SCE ran a nationally-recognized, award-winning Residential Quality Installation program training HVAC contractors and verifying their retrofit projects met the industry-standard requirements. Program results revealed significant market flaws that make achieving program objectives and energy savings in a cost-effective manner prohibitive. There appears to be a limited number of contractors who are able to implement the industry standard for HVAC quality installation. That, coupled with a low percentage of energy-code compliant HVAC contractors and the lack of knowledge among HVAC customers about the benefits of HVAC quality installation results in poor program uptake, costly measure costs, and a program that produces non-cost-effective savings.

In 2017 and into 2018, Residential HVAC education, training and outreach activities will be supported through Codes & Standards. Emerging Technologies will explore the use of diagnostics tools and utility smart meter data to capture increased energy savings above existing baseline (AB802). Whole house retrofit programs could incorporate Residential Quality Installation standards which promise increased energy savings as more contractors understand the benefit to their customer of improved comfort and lower energy bills.

Statewide Administration of Residential HVAC programs will be led by SDG&E. SCE will contribute to evaluation and implementation of the statewide program through the solicitation of third-party providers for program activities that cost-effectively increase customer awareness of the value of HVAC installation and maintenance practices, while educating a broader number of residential HVAC contractors on the merits of energy savings and quality installation best practices.

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[131] *Id.*

Residential Direct Install:[132] Residential Direct Install, to be launched in 2017, will provide comprehensive EE measures to targeted residential customers. The program aims to enhance EE knowledge and program participation in the residential market segment to drive customers to undertake deeper EE activities and retrofits.

3. Intervention Strategies

SCE will use the following intervention strategies to achieve the EE goals in the Residential sector in its 2018-2025 EE portfolio:

- Customer Incentives
- Delivery Channel
- Demonstrations
- Direct Install
- Financing
- Intelligent Outreach
- Midstream / Upstream Incentives
- Partnering
- Quality Assurance, and
- Single-Point of Contact

Descriptions of these intervention strategies are included in the Portfolio Summary chapter (Section III.C). SCE's strategies are based on targeting customer types. The following sections discuss strategies for specific customer types in the Residential sector.

a) Existing Building Retrofits: Homeowners and Renters

SCE will leverage multiple EE offerings to identify solutions that align with customers' level of interest and financial capability. This will keep customers engaged and support persistent and continuous energy management. Changes to current offerings and new approaches will enable third-party market actors to provide solutions for homeowners and

[132] Changes pending 2017 Advice Letter Filing 3465-E.

renters. Additionally, by utilizing behavioral interventions or access to their energy usage information, SCE can keep customers engaged in managing their energy use and achieving greater EE savings.

Figure 10 provides an overview of the continuous energy management cycle for homeowners and renters. Because customers have different needs and interests, they can enter the cycle at any point. Once customers are engaged through one offering or set of offerings, SCE will try to keep them continuously engaged through ME&O tactics and helpful features on SCE.com, such as online audits and access to usage data.

Figure 10. The Homeowner / Renter Continuous Energy Management Cycle

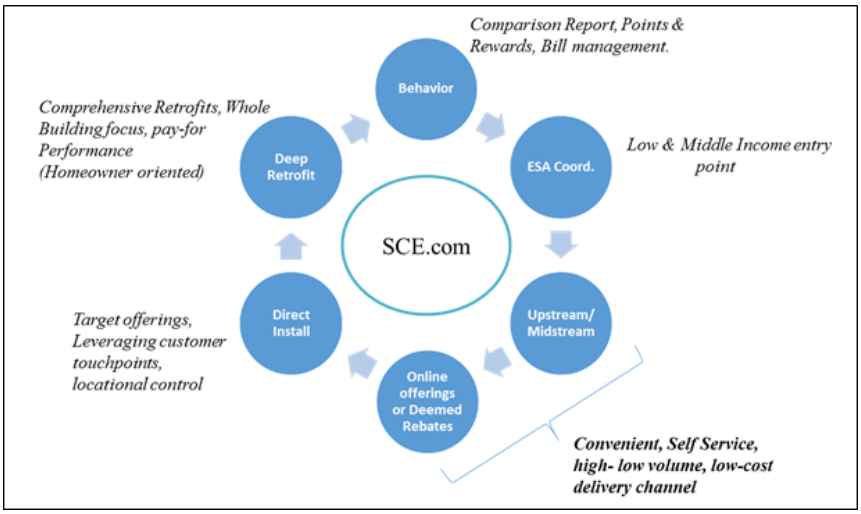


Table 15 identifies the intervention strategies SCE will use for existing building retrofits for homeowners and renters. Specific programs and tactics will be discussed in more detail in Implementation Plans or in conjunction with third-party solicitations at the appropriate time.

Table 15. Homeowner / Renter Existing Building Intervention Strategies

Strategy	Tactics
Existing Strategies / Tactics	
Partnering	• Train market participants (e.g., HVAC contractors, building inspectors, etc.) about the requirements and benefits of quality HVAC installation to support code compliance. • Support home buyers through real estate agents and appraiser education to better understand the value of EE.

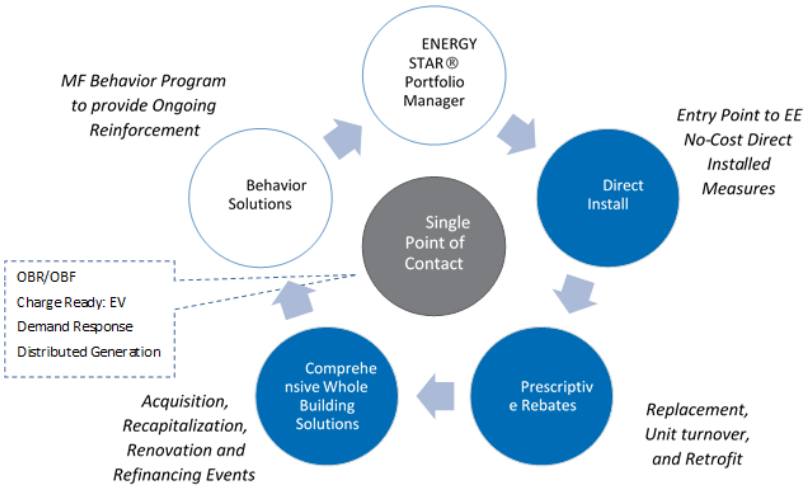
Strategy	Tactics
	• Encourage third parties to develop and explore new high-quality, cost-effective products to support lighting innovation.
Quality Assurance	• Educate consumers on the benefits of HVAC Quality Installations as a part of a whole-house approach. • Continue to support the development of higher-quality, more efficient products and technologies through ongoing influence with manufactures, retailers, and industry stakeholders.
Customer Incentives	• Provide downstream incentives to customers to adopt whole house solutions. • Pursue customer and contractor adoption of EE measures by incentivizing market actors to reduce the cost of stocking high-efficiency products and generating customer demand for targeted and high-impact measures.
Upstream Incentives	• Continue to mandate that manufactures and retailers transfer 100 percent of the SCE customer incentive to end-users in the form of reduced prices. • Encourage manufacturers and retailers to provide additional price reductions of their own.
Delivery Channel	• Targeted delivery and support of high-efficacy lighting to focus on stocking products in more stores and those where free-ridership is lower.
Intelligent Outreach	• Outreach to drive contractor participation in providing whole house solution to customers.
Modified Strategies / Tactics	
Intelligent Outreach	• Simplify online customer engagement and access to streamline the customer experience and drive participation in self-service options. This addresses customer hassle- and uncertainty-related barriers. • Engage customers through behavioral offerings to drive EE adoption and conservation.
Financing	• Expand and promote financial offerings to overcome up-front cost and performance uncertainties.
New Strategies / Tactics	
Direct Install	• Provide no-cost measures for SF residents to overcome up-front cost barriers for EE adoption and support all occupants.
Midstream Incentives	• Pursue midstream energy savings by incentivizing retailers and manufacturers to reduce the cost of stocking high-efficiency appliance products for consumers.
Customer Incentives	• Incorporate emerging market technologies to help consumers manage their energy use where cost-effective. • Provide downstream incentives to customers for targeted or low-volume products such as emerging, and energy management technologies to enable customer control and information where cost-effective. • Provide co-pay options for customers to adopt additional improvements to leverage direct install touchpoints and provide more customer choices. • Shift whole house solutions towards pay-for-performance and align customer and contractor incentives to drive participation in high-performing energy retrofits.
Intelligent Outreach	• Augment and deploy targeted customer outreach to customers with high potential for energy savings. • Provide meaningful energy feedback tools and/or recommendations to customers to better manage their energy use, such as social behavioral interventions or positioning EE communications based on customer attributes.

Strategy	Tactics
	• Provide a consumer knowledge base online tool to support customer adoption of and information about EE products such as EMTs, etc.
Single Point of Contact	• Provide a single point of contact for multi-utility offerings to deliver water, gas, and electric savings

b) Existing Building Retrofit: MF Facility Managers and Owners

The perceived complexity, time requirements, and effort of participating in EE programs present barriers to program participation in the MF market. As such, convenience is an important determinant of participation. Reports evaluating MF EE programs emphasize that owners prefer single POC program models to complete EE projects. In addition, once owners have a positive experience, they are likely to participate more extensively in EE programs at a building and/or portfolio level. SCE will use a single POC delivery model, depicted in Figure 11, for this customer segment.

Figure 11. SCE's Single POC Delivery Model



SCE has adopted the following best practices in its approach, as recommended in recent American Council for an Energy Efficient Economy (ACEEE) and other MF related publications:

- Simplify the customer engagement process. In addition to using a single POC, this includes allowing for multiple paths and staggered investment strategies to upgrade MF buildings over time.[133]
- Streamline program implementation. This includes integrating direct install and rebate programs by using direct install programs to offer no-cost EE measures, which can facilitate onsite assessments and encourage property owners to take advantage of rebates for more extensive improvements over time. It also includes serving low-income and market-rate MF properties through a single POC and coordinating programs across electric, gas, and water utilities.[134]
- Partner with local MF housing industry stakeholders.[135]
- Use the Environmental Protection Agency's (EPA's) Energy Star® Portfolio Manager to benchmark and track progress toward goals.[136]

Table 16 identifies the intervention strategies SCE will use for the MF market. Specific programs and tactics will be discussed in more detail in Implementation Plans or in conjunction with third-party solicitations at the appropriate time.

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[133] Kate Johnson, Apartment Hunters: Program Searching for Energy Savings in Multifamily Buildings (Dec. 2013), *available at* http://www.aceee.org/research-report/e13n.

[134] *Id.*

[135] *Id.*

[136] *Id.*

Table 16. MF Owner / Manager Existing Building Intervention Strategies

Strategy	Tactics
Existing Strategies / Tactics	
Partnering	Provide education and outreach to trade organizations, local governments, and portfolio operators to increase awareness and drive program participation.
Single POC	Simplify owner engagement to reduce multiple customer touchpoints.
Direct Install	Provide no-cost measures for MF properties to overcome up-front cost barriers to EE adoption, to support all occupants and leverage customer touchpoints.
Customer Incentives	Provide incentives to property owners to adopt EE solutions for both dwelling and common area locations.
Modified Strategies / Tactics	
Partnering	Expand partnering efforts to increase focus on low-income and rural customers through increased coordination with relevant agencies.[137] Partner with the local MF housing industry.
Single POC	Leverage SPOC and authorized contractors to offer direct install, prescriptive rebates, whole building, and any other MF solutions that are available through existing programs. • Simplify owner engagement to reduce multiple customer touchpoints. • Provide additional SPOCs to provide better coverage and support to all MF sub-segments • Use qualified contractors to fulfill the SPOC role when working with small to medium property/portfolio operators.
Direct Install	Provide no-cost measures for MF properties to overcome up-front cost barriers to EE adoption, to support all occupants and leverage customer touchpoints. Integrate direct install program delivery with the ESA Program to better serve both low-income and market-rate multifamily properties and improve program participation.
New Strategies / Tactics	
Benchmarking	Foster ongoing relationships with facility managers and owners about energy use to enable investment prioritization through benchmarking. Use the EPA's Energy Star® Portfolio Manager to benchmark and track progress toward goals.
Intelligent Outreach	Use of energy use, data analytics to identify high opportunity properties to engage and educate owners about their energy use to enable investment prioritization.
Financing	Explore On-Bill Financing (OBF)/On-Bill Repayment (OBR) programs in order to overcome up-front cost and performance uncertainties for multifamily properties.

c) New Construction: Builders and Developers

The Residential New Construction market will be negatively affected by the adoption of the 2016 Title 24 code (effective January 1, 2017). ZNE is not commonplace in the market; however, with recent code changes, the cost of achieving energy savings beyond the

[137] For example, the U.S. Department of Housing and Urban Development, California Tax Credit Allocation Committee, the U.S. Department of Agriculture, and Tribal Governments.

2016 code is higher for incremental savings. It is vital to transition the program to a more sustainable format in order to continue supporting ZNE development. The Residential New Construction program will no longer take new applications for the California Advanced Homes Program (CAHP), but will continue to pay CAHP incentives on its existing portfolio of previously committed projects through 2019. Additionally, with the elimination of non-cost-effective CAHP resource activities, SCE recognizes the ongoing need to support and develop residential 2020 ZNE goals as well as commercial ZNE 2030 goals. SCE will work with stakeholders to develop a mechanism to support comprehensive ZNE efforts through an alternative program, pilot, or demonstration, through the C&S Program.

Table 17 identifies proposed SCE strategies and supporting functions for new construction builders and developers. Specific programs and tactics will be discussed in more detail in Implementation Plans or in conjunction with third-party solicitations at the appropriate time.

Table 17. Builder / Developer New Construction Intervention Strategies

Strategy	Tactics
Existing Strategies / Tactics	
Intelligent Outreach	Disseminate best practices of CAHP projects and programs using ZNE as a reference point, and evaluate CAHP database to assess ZNE rating through industry partners.
Demonstration Projects	Emerging Technologies: • Explore single-family and multifamily demonstration projects of near-ZNE or ZNE homes to foster industry awareness and dissemination of best practices. • Investigate demonstration(s) of community-based approaches for meeting ZNE requirements.
Modified Strategies / Tactics	
Partnering	Codes & Standards (refer to Chapter IX Section A for more details): • Provide technical expertise and training for energy modeling software (CBECC Res)[138] to achieve code compliance • Support Reach Codes for LGs to pursue above-code savings (supporting ZNE) • Provide building code advocacy for 2019 Title 24 which aims to develop a ZNE code for homes by working with the builders, CEC and stakeholders, and • Engage in WE&T activities (also listed in the Cross-Cutting chapter).
New Strategies / Tactics	
Integration	Explore new program components, pilots, and/or demonstrations to further support ZNE efforts.

4. Residential Sector Metrics

For some of the specific barriers and challenges in the Residential Sector, SCE has determined an objective for its EE portfolio and metrics to track progress against these objectives. Please see Section III.I for SCE's portfolio metrics and approach to metrics in general. Table 18 identifies the Residential sector objectives and metrics and the intervention strategies SCE plans to use. The Residential sector metrics will be tracked semi-annually and will be based on program tracking data.

[138] Software used for modelling new construction energy use and compliance.

Table 18. Residential Sector Objectives and Metrics

Sector Barriers / Challenges	SCE Objective	Intervention Strategies	Metric
Homeowners / Renters			
Deep, holistic and quality home retrofits have high cost relative to expected energy savings making the current design challenging for customers and unattractive for ratepayers.	Drive targeted adoption of whole house EE improvements.	• Partnering • Intelligent Outreach • Customer Incentives • Direct Install • Financing	Number of participants in deep energy retrofits.[139]
As currently designed, low UES and high transactional cost are reducing the value of traditional downstream approaches for mass market and mainstream technologies for market transformation activities.	Increase adoption of self-service tools and offerings.[140]	• Partnering • Quality Assurance • Midstream Incentives • Delivery Channel	Number of participants using self-service tools and offerings[141]
Need for engagement tools to drive continuous customer behavior, persistence and program participation.		• Intelligent Outreach	
Increasing codes and standards for residential lighting products will impact savings opportunities and require market support to avoid recidivism.		• Partnering • Quality Assurance • Upstream Incentives • Delivery Channel	
MF Building Owners and Managers			
Participants in the MF sector are fragmented and diverse creating challenges in aligning drivers for increased EE adoption.	Increased adoption of EE solutions by the MF segment	• Partnering • Intelligent Outreach • Customer Incentives • Direct Install • Single Point of Contact • Financing	• Number of MF participants in PA programs. • Number of properties that participate in benchmarking
Builders / Developers			
Increasing cost associated with marginal increases in above code savings for new construction is driving reduced savings and increase complexity for market's code compliance.	Increase of efficient, new construction and support for near ZNE and ZNE homes	• Partnering • Intelligent Outreach • Demonstration	SCE will work with stakeholders to adopt or develop appropriate ZNE programmatic metrics. Please see relevant Codes and

[139] Deep retrofit can mean 10 percent of savings or set kWh savings such as 10 percent of average residential customer usage. A general definition will allow tracking of non-program specific focus and enable third-parties a directional measurement tool.

[140] Metrics for specific products and/or programs will be developed as a part of the implementation plan process.

[141] Self-service tools and offerings are low touch point program offerings. Examples include, but are not limited to: Home Energy Reports, Energy Audit tools, upstream/midstream offerings, or online, self-service products.

Sector Barriers / Challenges	SCE Objective	Intervention Strategies	Metric
			Standards and Emerging Technologies' Chapters for more ZNE detail.

5. Pilots

SCE plans to leverage at least two pilots to support continuous improvement of Residential sector strategies. These pilots are discussed in more detail below. SCE will coordinate with statewide lead PAs on pilots to enhance statewide programs and subprograms.

a) 10-10-10+ MF Behavioral Pilot (Aka Communities for Conservation)

This pilot is a partnership with SoCalGas and Water Municipals. It incorporates using multiple behavior intervention strategies to influence MF complexes to reduce consumption of gas, water, and electricity by ten or more percent.[142] The pilot is being implemented using a randomized control trial (RCT) with a randomized encouragement design using industry-adopted behavior interventions such as competition, feedback, benchmarking, and commitment. If the pilot is successful in achieving reductions in consumption, this top-down approach of MF benchmarking can identify a process and workpaper to support claiming savings for MF complexes that upload data through EPA's Energy Star® Portfolio Manager. The pilot will start in 2017 and SCE expects results from the pilot to be available in 2018.

6. Energy Pledge

This pilot is designed to leverage Energy Star® and industry-adopted behavioral strategies in the form of pledges to motivate customers to change their behavior and reduce energy consumption within their homes. This pilot is designed with six bi-monthly mailings to enlist pledge commitments, within an RCT design. Since no data analytics are required, this may prove to be a low-cost behavior program alternative to Home Energy Reports, using comparative energy usage analytics. This pilot completed in 2016 and SCE expects to have results in 2017.

[142] For more details about the pilot, please refer to SCE's AL 3157-E and 3157-E-A.

The evaluation results will yield insights into the cost-effectiveness of implementing alternate behavior approaches.

E. Budget

Table 19 shows SCE's planned budget for the Residential sector for 2018-2025. The majority of the change in budget between 2017 and 2018 is associated with the decrease in primary lighting due to the changes in code. More details about SCE's budgeting process are described in the Portfolio Summary chapter (Section III.F).

Table 19. SCE's Residential Sector Proposed Budget for 2018-2025

Program Year	Administration ($000)	Marketing ($000)	Direct Implementation ($000)	Incentives ($000)	Total Sector Budget ($000)
2015[143]	$2,918	$3,034	$18,555	$68,640	$93,147
2016[144]	$3,907	$2,016	$20,934	$68,419	$95,277
2017[145]	$4,879	$1,992	$16,095	$70,479	$93,444
2018	$2,104	$1,801	$15,164	$45,546	$64,615
2019	$2,168	$1,855	$15,619	$54,894	$74,535
2020	$2,211	$1,892	$15,931	$64,091	$84,124
2021	$2,167	$1,854	$15,612	$62,808	$82,442
2022	$2,232	$1,910	$16,081	$64,693	$84,915
2023	$2,299	$1,967	$16,563	$66,634	$87,463
2024	$2,368	$2,026	$17,060	$68,632	$90,087
2025	$2,439	$2,087	$17,572	$70,692	$92,789

F. Coordination and Integration

1. Key Partners

To successfully deliver EE in the Residential sector, SCE interacts and integrates with the following key partners:

Regulatory and Legislative agencies: CPUC, CEC, and other federal, state, and local government agencies.

[143] Actual expenditures.
[144] Actual operating budget.
[145] Proposed budget.

PAs: Other PAs are key SCE partners in program development, implementation, and coordination. Examples include other IOUs, RENs and CCAs.

Advocacy Groups: These are stakeholder groups that represent constituencies affected by EE, such as environmental advocacy and customer advocacy groups.

Trade partners: These are companies providing implementation and technical support for EE programs, or associations representative of industry participants. This includes third-party implementers.

Table 20, identifies many of the key partners in the residential sector for each customer type. Partners and tactics will be discussed in more detail in Implementation Plans or in conjunction with third-party solicitations at the appropriate time.

Table 20. SCE's Key Partners in the Residential Sector

Customer Type	Key Partners	
SF (Homeowners / Renters)	**Plug Load**	Manufacturers, retailers, contractors, SW PAs, NEEP, National EE Alliance (NEEA), etc. For nationwide collaboration activities: DOE, EPA EnergyStar, and SW PAs.
	Whole house and HVAC	Distributors, contractors and raters, SW PAs, CEC, CPUC, trade associations (e.g., IHACI), manufacturers, ACCA, EPA's Energy Star®-Verified HVAC Install Program.
	Behavior	Behavior and energy management solution providers, SW PAs, CPUC Staff, program evaluators and industry advocates.
	Lighting	Lighting manufacturers, retailers, state policy makers, lighting trade and associations, SW PAs, EPA, DOE, and CEC.
MF	MF property owners and operators, property and facility managers, renters, architects and engineers, housing industry associations, commercial real estate industry, financial institutions, lenders, and brokers, IOUs and PAs, CPUC, CEC	
New Construction	Building Industry Association of Southern California (BIASC), California Building Industry Association (CBIA), National Association of Home Builders (NAHB), industry, building officials, real estate agents, appraisers, local government partnerships transitioning from Residential New Construction to Codes & Standards	

2. Cross-PA Coordination

Several statewide programs will be managed statewide with lead PAs. Close coordination among the lead PA and other PAs, as well as with cross-cutting EE programs, will be critical to the success of this sector.

a) Statewide Program Coordination

The Portfolio Summary chapter (Section III.E) includes a detailed description of the approach to statewide administration. The Residential sector programs that are part of the new statewide administration model include the following, with descriptions of SCE's transition expectations:

Plug Load and Appliances: Mid-stream applications will transition to the assigned statewide lead. SCE will maintain the ability to control its budget commitments to better enable it to manage a cost-effective portfolio.

Residential New Construction: As explained in SCE's 2017 EE Budget Advice Letter (AL 3465-E), the Residential New Construction market will be negatively affected by the adoption of the 2016 Title 24 code (effective January 1, 2017). Although ZNE is not common within the market, recent code changes make the cost of achieving energy savings higher than incremental savings. As a result, SCE's Residential New Construction program will no longer accept new applications for the California Advanced Homes Program (CAHP), but will continue to pay CAHP incentives on its existing portfolio of previously committed projects through 2019. Additionally, because of the elimination of non-cost-effective CAHP resource activities, SCE will continue to support and develop residential 2020 ZNE goals as well as commercial ZNE 2030 goals. SCE's Residential New Construction activities will shift to focus on ZNE and will be lead through activities under a ZNE pilot led by Codes & Standards. Statewide Administration of the Residential New Construction program will be transitioned to SoCalGas, however, SCE will continue to manage its budget to help maintain a cost-effective portfolio.

Residential HVAC: In SCE's 2017 Budget Advice Letter (AL 3465-E), SCE proposes to discontinue the Residential HVAC program. However, SCE will work closely with SDG&E, as the Statewide Administrator for Residential QI/QM and HVAC Upstream, to identify pathways for Residential HVAC to be cost-effective. SCE is committed to supporting pilots or programs that increase customer awareness of HVAC best practices, empower the HVAC industry to standardize code-compliant contractor training, and capture increased energy savings above existing baseline through methods consistent with CEC standards for cost-effectiveness. SCE will continue to manage its budget for Residential HVAC end use activities in order to maintain a cost-effective portfolio.

Primary Lighting, Lighting Market Transformation and Lighting Innovation: SCE is the proposed lead PA for the Primary Lighting, Lighting Marketing Transformation (LMT) and Lighting Innovation (LI) subprograms. As discussed in SCE's 2017 Budget Advice Letter (AL 3465-E), SCE plans to discontinue the LMT and LI programs as stand-alone program areas and integrate some aspects of the programs into the Emerging Technologies program.

Table 21 provides additional details for the statewide Lighting program proposal.

Table 21. Statewide Lighting Program Details

Program Name: Lighting Program (formerly consisting of Primary Lighting, Lighting Innovation, and Lighting Market Transformation programs)	
Program Description: The Lighting Program engages lighting manufacturers who enroll in the Primary Lighting component of the program and supply retailers with energy-efficient lighting products. These products are then sold to customers at a reduced price. An incentive reimbursement is paid to the manufacturer that facilitated the discounted rate at its own expense. 100 percent of the incentive is passed on to the customer, making the Residential Lighting Program a "pass-through" of incentives, which is one form of an Upstream Program. In addition, the Lighting Program will work in collaboration with the Electric Emerging Technologies Program or via new, innovative third-party programs to bridge the gap between early adopters and the consumer majority.	
Program Objectives: • Support and reinforce the 2018 and 2019 Title 20 Equipment Code changes for general service lighting products • Create and maintain persistence LED sales in market sectors not likely to persist otherwise • Transform the retail LED market more rapidly than codes alone can • Identify new lighting measures for incorporation into the Lighting Program in collaboration with the ETP	**Potential Metrics**: • Number of retailers in each assigned sector persisting in carrying and selling the manufacturer's high-efficiency general service lighting products (excluding products left over from 2017 program activity) • Number of retailer locations that display utility-designed educational signs or displays for at least five consecutive months, verified by inspections • Number of retailers trained and subsequently scrutinized as a result of suspected non-compliance These metrics will be reviewed throughout each year. Year-end sector results in 2019 will set the baseline for each subsequent year.
Solicitation Strategy: SCE will include the Lighting Program in its Solicitation for Innovation. PAs will collaborate to review bids prior to contracts being awarded.	**Transition Timeline:** The transition to non-resource activities is scheduled for January 1, 2018. Planning and Preparation will occur in 2017.

b) Regional Strategy Coordination

SCE has worked closely with the Southern California Regional Energy Network (SoCalREN) in their delivery of the Southern California Regional Energy Center (SoCalREC), Finance, and Home Upgrade programs. SoCalGas is the lead PA for contract oversight and SCE provides additional fiscal oversight. The three PAs have also established protocols for proper engagement to help customers avoid confusion and provide clarification on roles. SCE and SoCalGas also have monthly coordination calls and other meetings as needed. SCE, SoCalGas, and SoCalREN will continue to work together so that SoCalREN's programs are

complementary and not competitive to IOU programs. SCE will work to provide support to SoCalREN for their residential, public agency, cross-cutting programs.

G. Integration with Cross-Cutting

1. Statewide Marketing, Education, and Outreach (ME&O)

SCE will employ the following specific strategies to integrate SW ME&O within the Residential sector:

- Integrate and cross-promote with existing marketing campaigns for DSM program participation.
- Integrate communications with other programs, such as Time of Use (TOU) rate communications or New Construction, to provide target audiences with a holistic view of all available options in the portfolio and to promote EE products as a way to save energy.
- Leverage seasonality by taking product seasonality trends into account, with certain times of the year being more marketing-intensive than others. For example, the spring season and the holiday season are strong sales months for home technology products.
- Leverage local community partners and relationships, community-based organizations (CBOs), and third-party strategic alliances.
- Provide in-language communications for ethnic and hard-to-reach customers.

In addition, the Residential sector will use targeted marketing to build awareness and educate residential customers to participate in relevant EE options. Intelligent outreach tools will be used to deliver specific messages to specific customer groups, to drive the participation of key audiences through analytics and research, and to increase EE adoption.

2. Workforce Education & Training Program

The WE&T section of the Business Plan Cross-Cutting Chapter provides details on the WE&T program. This section provides high-level descriptions of how WE&T interacts with the Residential sector.

The Residential sector coordinates with WE&T to incorporate and integrate industry-specific education and training opportunities. As part of this effort, the following are a few cross-cutting strategies on which the sectors will collaborate:

- Continue to deliver industry-valued, standards-based residential HVAC quality installation and maintenance curricula and pathways to certification.
- Work with current training providers to enhance Residential HVAC technical and "soft" skills offerings that increase contractor proficiency in both the HVAC and home performance industries.
- Develop new curricula and other educational tools and offerings, targeted to high-potential market actors and decision makers, to enhance their knowledge of the technological innovations and integrated business strategies required to effectively understand, interpret, and meet ZNE goals.
- Develop a well-informed support industry to residential new construction builders and developers, including building inspectors, financial and real estate professionals, appraisers and other entities central to the advancement of residential ZNE.

3. <u>Emerging Technology Program (ETP)</u>

The ETP section of the Business Plan Cross-Cutting Chapter provides more details on the ETP program. This section provides high-level descriptions of how ETP supports the Residential sector.

In the Residential sector, some of the largest opportunities for savings are in mass-market programs that have a low per-intervention cost, specifically behavioral, upstream, and performance-based programs. The statewide ETP will continue to support these types of measures in a number of ways.

For behavioral programs, the ETP will continue to explore solutions such as providing customers with detailed information on energy use and boosting savings through

gamification[146] or the use of apps. All of these solutions mean adopting new technologies that the ETP would be (or has already been) active in evaluating.

To develop more robust upstream programs, the ETP will work with product developers to integrate energy-saving attributes in the product design phase. Using other beneficial attributes of products can be the primary driver of market adoption. This is useful when working upstream, as it means that EE does not need to be the top customer consideration; it can simply be a bonus feature of a product that also offers security, comfort, or a boost in productivity.

Performance-based programs will become increasingly feasible as new, advanced methods to evaluate savings emerge. These evaluation methods could streamline the EM&V process and make program participation easier for residential customers. Through the M&V process, the statewide ETP has already started to generate data that can support this evolution.

Beyond these low-cost interventions, the ETP supports the Residential sector in other ways. One notable example is assisting with utility EV efforts. Because EVs can use as much power as a home, they pose significant risks to the grid by straining distribution systems in neighborhoods with high adoption rates. By evaluating EV charging technologies, as well as the way in which customers interact with the technology, the ETP is paving the way for large-scale EV adoption to take place in a way that minimizes risk to the grid but also achieves customer satisfaction by offering practical charging options with minimal inconvenience.

Finally, the statewide ETP is monitoring the evolution of connected technologies within the home. AB 793 requires IOUs to offer such technologies to residential customers and ETP has provided support in identifying and analyzing candidate products. As connected appliances continue to proliferate, the ETP will monitor this industry and will look for individual technologies and suites of products that are an appropriate fit for DSM portfolios.

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[146] Applying game mechanics and/or game design techniques to motivate people to achieve their goals.

4. Codes and Standards (C&S)

The C&S section of the Business Plan Cross-Cutting Chapter provides more details on the Codes & Standards Program. This section provides high-level descriptions of how C&S supports the Residential sector.

The C&S Program is actively supporting the CLTEESP goal of delivering ZNE new homes by 2020. C&S supports the CEC in developing the 2019 Title 24 building energy standards that will require all new homes under four stories to be designed and built as ZNE buildings.

The C&S Program's Compliance Improvement subprogram activities support the replacement of air conditioners, water heaters, and other appliances that are installed in conformity with Title 24 standards. This is accomplished by supporting the CEC, building departments, and installation contractors to better understand the applicable Title 24 requirements for each project.

C&S advocates for cost-effective higher-efficiency household appliances, including televisions, general service lamps (light bulbs), computers, battery chargers, etc., that save energy for all residential customers. The C&S program provides this advocacy to both the CEC as well as the DOE to support their appliance rulemaking process by providing technical, economic, market, and performance data to justify higher efficiency levels than what would otherwise occur.

H. EM&V Data Collection Needs and Anticipated Study Needs

SCE is working with the CPUC Energy Division and other PAs to update the 2017 M&V roadmap.[147] A comprehensive update is planned for Q1 2017 to better reflect the study needs identified in the statewide business planning process.

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[147] *See* California Public Utilities Commission, Energy Division, 2013-2016 Energy Division & Program Administrator Energy Efficiency Evaluation, Measurement and Verification Plan Version 6 (Dec. 2015), *available at* http://www.energydataweb.com/cpucFiles/pdaDocs/1401/EMV%20Evaluation%202013-2-2016%20Plan%20V6.1_2015-PublicDraft.pdf.

The following studies are needed to support the Residential sector:

- Customer characterization and wants / needs study, especially for EMS support
- CLASS Study update
- Performance metric baseline study
- Workpaper updates, and
- Impact and process evaluation studies to support program improvements.

V.

Commercial Sector

A. Commercial Sector Vision and Goals

SCE's vision for its Commercial sector is to achieve cost-effective energy savings by tailoring EE services based on customer size and behavior, piloting innovative EE solutions, and increasing education and awareness for customers and partners. California has established several policy goals that rely on increased energy efficiency. The Commercial sector accounts for 36 percent of electric usage in SCE's territory; thus, it plays an integral role in achieving these state policies.

SCE's primary goal for the Commercial Sector is to achieve 194.19 GWh and 45.4 MW in electric energy savings in 2018. Table 22 shows SCE's annual savings forecasts for the Commercial sector through 2025 (including claimed savings for 2015 and projected savings for 2016 and 2017). These forecasts are based on the overall portfolio goals from D.15-10-028.

Table 22. SCE's EE Commercial Sector Savings Forecast 2018-2025

Program Year	Total kWh Sector Savings	Total kW Sector Savings
2015[148]	211,622,092	47,009
2016[149]	227,905,939	49,353
2017[150]	218,508,623	47,115
2018	197,577,971	44,781
2019	203,505,310	46,124
2020	207,575,417	47,047
2021	203,423,908	46,106
2022	209,526,625	47,489
2023	215,812,424	48,913
2024	222,286,797	50,381
2025	228,955,401	51,892

[148] Claimed savings.
[149] Projected savings.
[150] Projected savings.

B. Commercial Market Characterization

SCE's Commercial sector consists of approximately 520,000 service accounts.[151] In 2015, these accounts used approximately 36 percent (29,000 GWh) of the total electricity consumption (81,000 GWh) in SCE's service territory, which makes it the largest sector in terms of electricity consumption. Also in 2015, SCE's Commercial sector EE programs represented 38 percent of the total EE portfolio budget and achieved 29 percent of the portfolio's GWh savings. Because Commercial is such a prominent sector in terms of usage, budget, and savings, it provides some of the key opportunities for SCE's EE portfolio.

1. Customer Landscape

a) Segments and End Uses

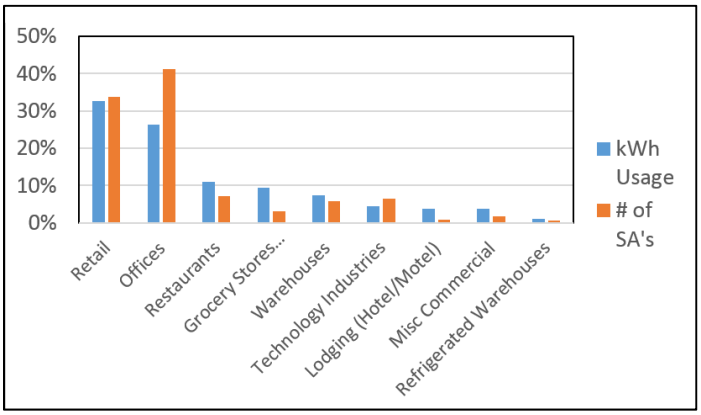
SCE's Commercial sector consists of the following customer segments:

- Retail
- Office
- Restaurants
- Grocery stores
- Warehouses
- Refrigerated warehouses
- Technology industries
- Lodging (hotel / motel), and
- Miscellaneous (assembly, etc.)

Figure 12 displays the percentage of all Commercial usage and percentage of all Commercial service accounts (SAs) for each Commercial segment.

[151] The Commercial sector does not count institutions such as schools and public hospitals, per sector-specific statewide categorizations agreed upon by PAs. Schools, public hospitals and other public institutions are accounted for in the Public sector.

Figure 12. Commercial Sector Electricity Usage and SAs by Segment

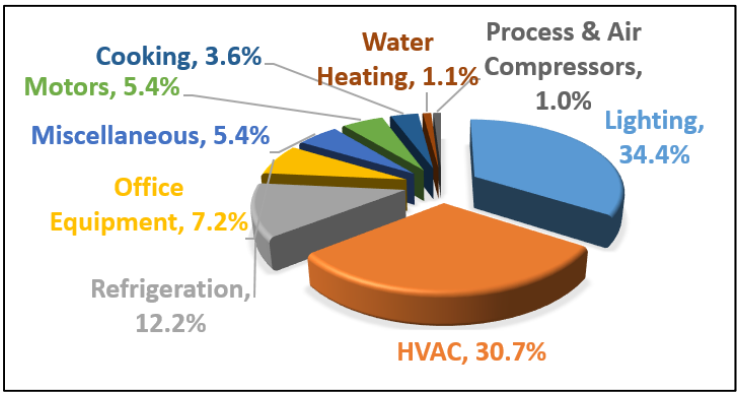


Commercial sector customers use electricity for the following end uses:

- Lighting
- HVAC
- Refrigeration
- Office equipment
- Motors
- Cooking
- Water heating
- Process & air compressors, and
- Miscellaneous.

Figure 13 displays the electricity usage in the Commercial sector in California by end use. Most of the electricity usage in the sector is for Lighting and HVAC (approximately 65 percent of all usage). Refrigeration and Office Equipment also make up a large portion of the usage (approximately 20 percent).

Figure 13. Commercial Sector Electricity Usage by End Use[152]



b) Customer Types

SCE analyzes Commercial customer types based on their electricity demand. Table 23 identifies the characteristics of SCE's three Commercial sector segments.

Table 23. SCE Commercial Sector Segmentation for EE

Segment	Demand	# of Accounts	% of Sector kWh Usage	Avg kW per Account
Large	≥250 kW	7,000	46%	670 kW
Mid-Size	≥50 kW, < 250 kW	33,000	27%	110 kW
Small	< 50 kW	478,000	27%	9 kW

Large Commercial customers make up approximately one percent of all Commercial SAs, but are responsible for 46 percent of annual Commercial electricity consumption, indicating a high opportunity for savings per customer. Between 2013 and 2015, SCE installed EE measures for 40 percent of all Large Commercial SAs. While this shows some success in engaging Large Commercial customers on EE, additional opportunities still exist.

Mid-Size Commercial customers make up approximately six percent of Commercial SA, but are responsible for 27 percent of annual Commercial electricity consumption, indicating a moderate opportunity for savings per customer. Between 2013 and 2015, SCE installed EE measures for 24 percent of all Mid-Size Commercial customers,

[152] *See* Itron, Inc., California Commercial End-Use Survey, p. 220 (Mar. 2006), *available at* http://www.energy.ca.gov/2006publications/CEC-400-2006-005/CEC-400-2006-005.PDF.

indicating that there are still many opportunities for EE adoption among Mid-Size Commercial customers.

Small Commercial customers make up approximately 92 percent of Commercial SAs, but are only responsible for 27 percent of annual Commercial electricity usage, indicating a low savings opportunity per customer. Between 2013 and 2015, SCE installed EE measures for nine percent of all Small Commercial SAs. While this indicates that there are still many opportunities for EE among small Commercial customers, these opportunities are not the most cost-effective due to the high cost of reaching customers and the low savings potential per customer.

2. Commercial EE Potential

Based on the most recent Potential Study, SCE has an achievable potential energy savings of 350 GWh, and an achievable demand savings of 58 MW, for the Commercial sector in 2018.[153] The achievable savings gradually increase to 437 GWh and 95 MW by 2026.[154]

The Commercial end uses with highest achievable savings potential for SCE through 2026 are Lighting, Whole Building, and HVAC.[155] These three end-uses account for 96 percent of the achievable energy savings potential and 97 percent of the achievable demand savings potential in 2018.

AB 802 requires the Commission to authorize PAs to count all energy savings achieved through eligible EE programs toward overall EE goals.[156] This includes "to-code savings," that is, energy savings achieved by bringing a customer's facilities up to code. The Potential Study analyzed the incremental potential that was previously stranded due to IOUs not being able to count to-code savings. SCE's Commercial sector has incremental savings potential

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[153] Navigant Consulting, AB802 Technical Analysis Potential Savings Analysis (Mar. 2016), *available at* http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=11189.

[154] *Id*.

[155] *Id*.

[156] Assembly Bill 802, *available at* https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160AB802

of 152 GWh and 36 MW in 2018 if to-code savings are counted.[157] These increase to 246 GWh and 56 MW by 2026, providing an additional 56 percent in energy savings and 59 percent in demand savings over the original achievable potential.[158] The significant majority of the incremental savings comes from Lighting and HVAC. Appendix E provides additional information on SCE's EE potential.

C. Commercial Sector Drivers

This section describes the drivers in the Commercial sector that shape the landscape of EE beyond the sector's market characteristics and potential. SCE describes various EE program trends and results of EM&V studies in this section.

1. Regulatory and Legislative Policies

The policy drivers for the Commercial sector are largely the same as general portfolio drivers described in the Portfolio Summary chapter (Section III.B.1).

2. Commercial Sector Portfolio and Market Trends

The Portfolio Summary chapter (Section III.B.2) describes the market trends applicable to all of the sectors in the EE portfolio. This section addresses trends specific to the Commercial sector.

SCE has found it increasingly difficult to maintain cost-effectiveness and support portfolio energy savings goals. Figure 14 shows that between 2010 and 2015, both the TRC and GWh savings for SCE's Commercial sector have declined significantly.

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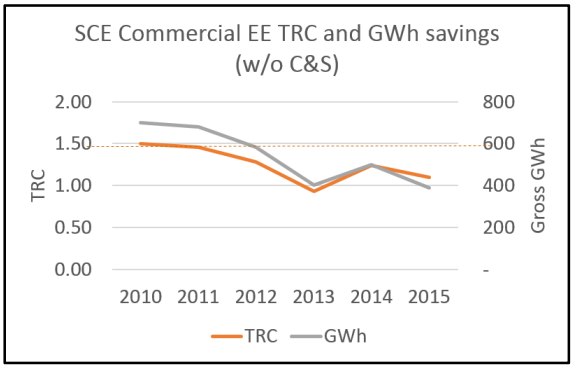
[157] Navigant Consulting, AB802 Technical Analysis Potential Savings Analysis (Mar. 2016), *available at* http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=11189.

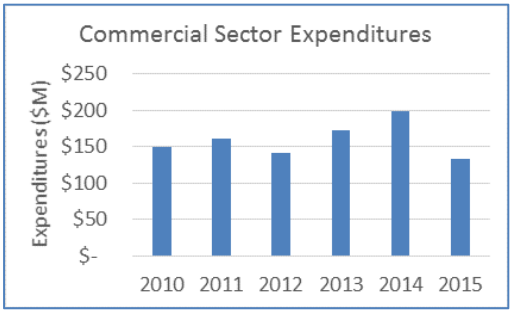
[158] *Id*.

Figure 14. SCE's Commercial Sector Energy Savings and Cost-Effectiveness 2010-2015[159]



During the same period, as shown in Figure 15, while TRC has been on the decline, Commercial sector expenditures have either increased or only slightly decreased. Expenditures in 2011, 2013, and 2014 were all higher than in 2010; expenditures in 2012 and 2015 were only $10 million to $20 million less than 2010.

Figure 15. SCE Commercial Sector Expenditures 2010-2015[160]



Several market trends have shaped SCE's Commercial EE portfolio. SCE discusses the market trends in the top three Commercial customer segments (by electricity usage) below.

Retail Segment Key Trends

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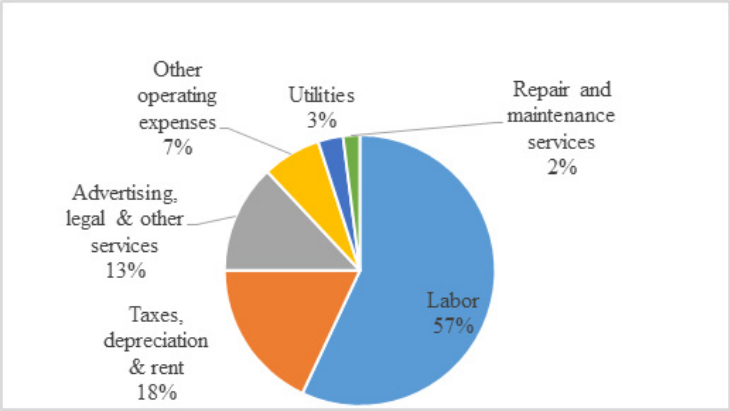
[159] Data generated using information from: California Energy Efficiency Statistics website *available at* http://eestats.cpuc.ca.gov/Views/Documents.aspx, does not include commercial non-resource program costs embedded in cross-cutting programs (e.g., ET, WE&T, etc.) and C&S cost and benefits. Includes Public sector-related savings and TRC impacts as EEStats does not yet recognize the newly defined Public sector (e.g., private schools have moved from the Commercial sector to the Public sector).

[160] *Id.*

- Retail customers' utility expenses are approximately three percent of their total costs (see Figure 16), resulting in EE having a low impact on their bottom line and making it more difficult to engage these customers.[161]

Figure 16. Retail Customer Operating Expenses by End Use



- In the U.S., more than 95 percent of all retailers have only one store and nearly 90 percent have fewer than 20 employees.[162]
- Online retail sales trends are increasing customer base without increasing facility costs.[163]
- Midsize retailers have significant energy costs but might not have the personnel to manage them.[164]
- Some retailers want to be green, but it must be cost-justifiable."[165]

<u>Office Key Trends</u>

- The top 80 percent of office electricity usage is for Lighting, HVAC and Computers (see Figure 17). As a result, SCE is focusing on a wide variety of downstream and midstream Lighting and HVAC programs, with future midstream work on Office Equipment-related technologies to be developed.

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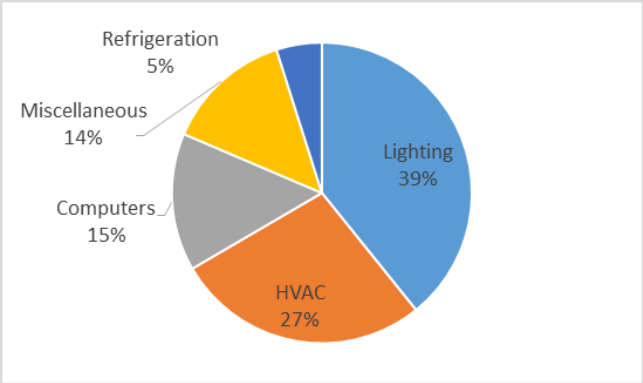
[161] Retail Sector Snapshot, Esource, 2012, attached as Appendix N
[162] *Id.*
[163] *Id.*
[164] *Id.*
[165] *Id.*

Figure 17. Office Energy Usage by End Use[166]



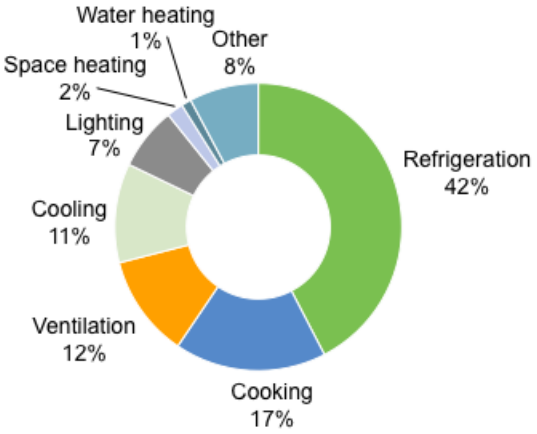
- Offices represent 19 percent of all commercial floor space and more than 17 percent of commercial buildings.[167]
- The utility bill is often the largest operating expense for office spaces in the U.S. (approximately 30 percent, including natural gas and others).[168]
- The top 50 property management firms control nearly half of U.S. commercial office lease space, but they are not the end users of energy in office buildings, as the tenants are, nor are they the beneficiary of capital improvements, as the owners are.[169]

Restaurants Key Trends

- The top 90 percent of restaurant electricity usage is from Refrigeration, Cooking, HVAC and Lighting (See Figure 18). Therefore, SCE is focusing on a wide variety of downstream and midstream Refrigeration, Food Service, Lighting and HVAC programs.[170]

[166] Office Sector Snapshot, Esource, 2012, attached as Appendix L
[167] *Id.*
[168] *Id.*
[169] *Id.*
[170] Restaurant Sector Snapshot, Esource, 2016, attached as Appendix M.

Figure 18. Restaurant Electric Usage by End Use[171]



- Food service facilities are nearly three times more energy-intensive than other types of commercial buildings.[172]
- The restaurant industry's greatest challenges include employee recruitment and retention, moderate sales growth, technology challenges, and the "American foodie 2.0"—younger generations that expect restaurants to adopt sustainable practices.[173]
- While efforts such as "greening" facilities and using environmentally friendly practices can attract and retain customers, restaurant managers need to ensure that energy-efficient measures do not damage the customer experience.[174]
- Restaurants often do not have the resources to test and assess the efficiency and effectiveness of new equipment.[175]
- The average profit margin for restaurants is 3 to 5 percent in the US.
- Utility expenditures account for 9 percent of operating expenses in US restaurants.[176]

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[171] *Id.*
[172] *Id.*
[173] *Id.*
[174] *Id.*
[175] *Id.*
[176] *Id.*

3. Sector Barriers and Challenges

There are several barriers specific to the Commercial, Industrial, and Agricultural sectors that have influenced SCE's EE portfolio proposals. Table 24 describes the barriers specific to these sectors.

Table 24. Commercial, Industrial, and Agricultural Sector Barriers

Market Barrier	Description
Information or search costs	• Customers have varying levels of knowledge of and experience with EE[177] [178] • Access to customer's energy data and how to translate that information into actionable EE decisions is complicated for small/mid-size customers[179]
Performance uncertainties	• Performance issues resulting from improper equipment installation, maintenance, or poor owner & operator education create customer dissatisfaction[180] [181] • SEM faces the challenge of demonstrating "clear-cut" savings attribution[182]
Hassle or transaction costs	• EE is not a top priority for them relative to making profits and increasing and maintaining production levels or meeting sector-specific compliance issues[183] [184]
Access to financing	• Small and mid-size customers lack the capital and/or qualified resources (facility and/or energy managers) to participate[185]
Organization practices or custom	• Decision-makers are hard to identify; multiple decision-makers in the industrial world make it difficult to kick-start EE projects[186] • Varying project development timeframes that may extend multiple years[187]

[177] Opinion Dynamics, PY2013-14 Third Party Commercial Program Value and Effectiveness Study Report, (Aug. 2016) (hereinafter "Opinion Dynamics Study Report 2016").

[178] Jennifer Fagan & Christina Torok, California Nonresidential Program Assessments Study: IOU Core Calculated Program Group Report (Dec. 2012) ("hereinafter Itron Study Report 2012").

[179] Opinion Dynamics Study Report 2016.

[180] *Id*.

[181] DNV-GL, Impact Evaluation of 2013-14 HVAC3 Commercial Quality Maintenance Programs (Mar. 2016), *available at* http://www.energydataweb.com/cpucFiles/pdaDocs/1454/HVAC3ImpactReport_PUBLIC_COMMENT.pdf.

[182] Heidi Ochsner et al., Impact Evaluability Assessment of California's Continuous Energy Improvement Pilot Program (Oct. 2013), *available at* http://www.calmac.org/publications/CA_CEI_Pilot_Evaluability_Assessment_REVISED_FINAL.pdf.

[183] Opinion Dynamics Study Report 2016.

[184] Itron Study Report 2012.

[185] Opinion Dynamics Study Report 2016.

[186] *Id.*

[187] Itron Study Report 2012.

Market Barrier	Description
Misplaced or split incentives	• Tenant and landlord split incentive (lessee mindset): Tenant and landlord both have little incentive to make EE improvements at their facilities[188]
Product or service unavailability	• Whole system opportunities are missed by individual equipment vendors, many of which provide only specific equipment types or building systems.[189] • It can be difficult to deliver scalable EE projects to industrial customers because they have unique processes and operations requirements.[190] • Dispositions and Industry Standard Practices (ISPs) may be artificially limiting measure availability to select customer sizes[191] [192]

4. Lessons Learned From Past Cycles and EM&V Studies

Results of several Commercial sector evaluation studies provide further insight on these trends and provide recommendations that will inform SCE's future approach to maintaining a cost-effective EE portfolio and enhancing the effectiveness of its custom engagement approaches. Key evaluation takeaways SCE leveraged to develop its Commercial portfolio include the following:

- Serving Commercial customers with greater variation based on customer size will better meet market needs identified in multiple Measure, Application, Segment, Industry (MASI) studies and will balance cost-effectiveness concerns, savings goals, and long-term GHG reduction goals.[193] SCE intends to transition its nonresidential portfolio where appropriate to size-specific EE service delivery based on customer energy savings potential.
- Commercial sector programs could improve their gross realization and net realization rates by better documenting existing baseline conditions, targeting

[188] Opinion Dynamics Study Report 2016.

[189] Itron Study Report 2012.

[190] *Id*.

[191] Navigant Consulting, Measure, Application, Segment, Industry (MASI): New Opportunities in the Food Processing Industry (Mar. 2015).

[192] Navigant Consulting, Measure, Application, Segment, Industry (MASI): New Opportunities for Oil and Gas Extraction and Produced Water Management and Recycling (Apr. 2015).

[193] Navigant Consulting, Measure, Application, Segment, Industry (MASI): Wastewater Treatment Facilities, p. 32 (Mar. 2015); Navigant Consulting, Measure, Application, Segment, Industry (MASI): New Opportunities in the Food Processing Industry, pp. 24, 26, 30 (Mar. 2015).

early replacement measures, and documenting influence. Current program design and implementation is losing about 40 percent of energy savings through NTG adjustment. SCE expects a combination of process improvements and newly eligible methodologies for claiming savings, along with the tailoring of customized services, to contribute to improved net and gross realization rates.

- Commercial sector programs must continue to drive awareness and adoption of industry standards, including ASHRAE 180, among contractors and technicians. SCE addresses improving industry awareness and other related activities in the WE&T sector chapter.
- To improve service for small and mid-size commercial customers, SCE will use a set of midstream program offerings for lighting, HVAC, controls, and others. For the majority of Commercial sector customers, these technologies cover the primary areas of potential savings opportunities for small and medium businesses.

D. SCE's Approach to Achieving Commercial Sector Goals

SCE has developed its Commercial sector EE portfolio to accommodate the drivers, recognize the market trends, and address the challenges described above in order to meet the sector goals. Historically, SCE has offered nonresidential programs to all customer types, regardless of their energy usage. During the timeframe of this business plan, SCE will shift away from a "one size fits all" approach for the nonresidential sector to a segmented set of offerings that aligns EE service opportunities with customer energy usage patterns. Within each segment, SCE will use intervention strategies appropriate for customer size and behavior. Customized services are primarily envisioned for large or mid-size customers with high energy savings potential while small and Mid-Size customers with less savings potential will primarily be offered midstream services.

1. Commercial Sector Strategy Overview

SCE's customer segmentation approach for the Commercial sector divides customers into three segments: Large, Mid-Size, and Small. Though many factors can affect a customer's EE needs, energy savings opportunities are largely driven by a customer's energy demand. Thus, segmentation is based on energy demand (See Table 23 above for information about SCE's Commercial segments)

For Large Commercial customers (and some Mid-Size customers with large energy savings potential), SCE will enhance its Direct-to-Customer offerings while introducing project implementation processes to improve gross and net realization rates. The Direct-to-Customer delivery approach will offer three tiers of customized service, described below:

Basic Services:

- Customer-specific services like audits, utilizing on-site visits or billing data, that would support AB 758,
- Technical assistance to support benchmarking components of AB 802 and Energy Star Portfolio Manager.

Mid-Level Services (Basic Services plus the following):

- Encouragement for customers to utilize financing opportunities to lower reliance on incentive-based interventions
- Customer-specific forecasting of OBF and OBR opportunities

Premium Services (Mid-Level Services plus the following):

- SEM services that engage participants at all employee levels
- Technical support for sophisticated energy management or control services
- Appropriate rebate forecasting for custom applications, and
- Whole-building and/or whole-facility metered measurement and verification planning, using established protocols. This support service may also yield new AB 802 implementation possibilities.

For Small and Mid-Size customers with low energy savings potential, that are more limited in their EE resources and knowledge, SCE will leverage its midstream Distributor Delivery channels. Key aspects of the Distributor Delivery model SCE will implement include:

- Leveraging of distributor channels and other existing programs/efforts/channels to drive awareness of EE value.
- Technology-based offerings such as distributor-focused midstream lighting, motors, and pumps for nonresidential applications, and upstream HVAC[194] address a majority of potential, with integration of Finance opportunities.
- Deemed measure development for small and mid-size customers' needs remains critical to expand offerings.

Table 25 identifies the specific delivery approaches by segment that SCE will employ for the Commercial customer segments.

Table 25. SCE Delivery Approaches by Commercial Sector Segment

Segment	Proposed Delivery Approaches
Large	• Direct-to-Customer tiers of service
Mid-Size	• Customers with high energy savings opportunities will be served through the Direct-to-Customer Delivery model • Majority of mid-size customers reached by distributor delivery channels for above-code energy savings
Small	• Customers with limited energy savings opportunities addressed through Distributor Delivery model described above

SCE also plans to conduct several pilots with partners in the Commercial sector to test different delivery models, technology options, performance-based program design, and other elements. SCE expects future pilots to advance key strategic functions such as the segmented

[194] SCE acknowledges that D.16-08-019 differentiates between downstream, midstream, and upstream delivery channels that will result in name changes to certain offerings. Historical names (before publication of D.16-08-019) are used throughout SCE's Business Plan when referring to pre-existing programs.

approach to delivering services, the capture of previously stranded potential opportunities, and the targeted deployment of EE resources.

SCE, recognizing the importance of the conclusions of various evaluation studies,[195] will also enhance training and education for small and mid-size commercial customers. These customers require additional training and education because they have more constraints than large customers in terms of energy management resources. SCE plans to increase collaboration with professional partners participating in WE&T programs to develop training content for industry needs in order to increase market exposure to key best practices.

2. Existing Programs and Services

To help overcome market barriers and achieve EE adoption, SCE currently offers a number of programs for Commercial sector customers. Several of these programs span the Industrial and Agricultural sectors as well. Table 26 describes the current sector offerings for the Commercial, Industrial, and Agricultural sectors.

Table 26. Existing Program and Services in the Commercial, Industrial, and Agricultural Sectors

Program Name	Applicable Sector	Program Description
Energy Advisor Services (EAS)	**C, I, A**	EAS brings together under one program all audit services offered to support customer education and participation in EE, DR, and DG energy-reducing opportunities and benefits, along with awareness of GHG and water conservation activities. These services include benchmarking, an online energy audit tool, nonresidential site audits, pump efficiency services, retro-commissioning (RCx), and coordination with the Continuous Energy Improvement program.
Calculated	**C, I, A**	The Calculated program offering provides standardized incentives for customized and integrated EE/DR projects for retrofit and RCx projects while also providing technical and design assistance. Customized calculation methods that can consider system and resource interactions, it will be the preferred approach for supporting the integrated, whole system, and multi-resource management strategies of the Strategic Plan and concurrently overcome technical and financial barriers. Calculated savings for the Savings by Design Program are achieved through the agricultural new construction component
Deemed	**C, I, A**	The Deemed Incentives program offering provides IOU representatives, equipment vendors, and customers an easy-to-use mechanism to cost-

[195] *See* Section III.E.

Program Name	Applicable Sector	Program Description
		effectively subsidize and encourage adoption of mass-market efficiency measures through fixed incentive amounts per unit or measure.
Continuous Energy Improvement (CEI)	**C, I, A**	CEI is a consultative service that targets long-term and strategic energy planning. CEI is designed to reintroduce the importance of energy management by transforming the market and to help reduce energy intensity through a comprehensive energy management approach including IOU and non-IOU products and services customized to fit different customer profiles. CEI will address technical and management opportunities for agricultural customers while creating sustainable practices through a high-level energy commitment from executive and board-level management.
Nonresidential HVAC	**C, I, A**	The Nonresidential HVAC program delivers a comprehensive set of upstream, quality installation, and quality maintenance strategies built around education, marketing efforts, and leveraged relationships within the HVAC industry geared to transform the market towards a sustainable, quality driven market.
Direct Install	**C (Third Party)**	The Commercial Direct Install Program provides small business customers that have a small peak demand the opportunity to have a third-party contractor retrofit existing systems to energy efficient systems at no cost to the customer.
Data Center EE	**C (Third Party)**	The Data Center Energy Efficiency program provides a comprehensive solution for the growing needs of data centers. It will provide a wide range of energy saving activities to data centers including HVAC/mechanical, controls, and lighting load reduction. The program uses a combination of traditional technologies combined with emerging technologies to offer comprehensive solutions. The program takes a holistic approach towards influencing behavior in data center management, including establishing industry metrics for data center energy intensity, creating tools and guidelines to drive continuous improvement, supporting third party certification processes, and providing recognition for data centers to achieve a high level of energy savings and demand reduction.
Healthcare EE	**C (Third Party)**	The Healthcare EE Program targets existing private medical facilities, including hospitals, acute care facilities, medical office buildings, service buildings, and central plants. The program encompasses EE opportunities with the following design features: comprehensive energy audits covering all key end-uses and measures for energy efficiency, technical assistance including support for measures specification, procurement, and project management, retro-commissioning for large-space conditioning systems, post-installation inspection to verify performance, workforce training and education of facility staff, incentives coordination SCE's other programs, and customer satisfaction surveys and resolution. Note: Public medical facilities are now served under the Public sector.
Lodging EE	**C (Third Party)**	The Lodging EE program (LEEP) is a comprehensive EE retrofit program that delivers multi-measure IDSM retrofits and RCx to small, medium, and large lodging facilities. Target facilities include existing hotels and motels as well as spas and resorts, especially those with central plants and in-house laundry service.
Commercial Utility Building Efficiency	**C (Third Party)**	The Commercial Utility Building Efficiency (CUBE) program is a multi-source cooperative approach designed to pinpoint privately owned commercial office and retail buildings for an equipment-incentive-centric

Program Name	Applicable Sector	Program Description
		plan enabling a consultant to introduce EE and DR measures as well as RCx. These measures traditionally have a low degree of penetration in commercial office and retail buildings. CUBE provides comprehensive energy audits and financial projections, and the internal and external funding sources of the Energy Services Company ('ESCO') model, to a market where lack of capital has traditionally been a significant barrier to the upgrading of capital equipment. This allows for extended repayment periods, positive cash flows, and low or no net up-front cost.
Enhanced Retro-commissioning	**C (Third Party)**	The Enhanced Retro Commissioning Program helps facilities realize both short-term and long-term energy savings through an innovative approach leveraging technology applications such as whole-building meter data analysis, while reducing the amount of time conducting on-site audits to find potential EE projects.
Comprehensive Chemical Products	**I (Third Party)**	The Comprehensive Chemical Products program addresses industrial customers in the chemical processing industry, and offers a wide full range of EE opportunities from low-cost improvements to entire system upgrades to participants. The program is centered on a comprehensive approach to energy savings and permanent demand reduction.
Comprehensive Petroleum Refining	**I (Third Party)**	The Comprehensive Petroleum Refining program targets all the major petroleum refineries in SCE's service territory to produce long-term, cost-effective electrical energy savings. The program achieves this goal by implementing a comprehensive set of calculated and deemed approaches to address every major electric operation within the oil refining industry.
Oil Production	**I (Third Party)**	The Oil Production program offers oil and gas producers and transportation equipment manufacturers support through all EE project phases - from project identification through development, installation, and review. This is a comprehensive program for EE using motors and equipment, lighting, air conditioning, and refrigeration.
Food & Kindred Products	**I (Third Party)**	The Food & Kindred Products program plans to deliver energy savings and demand reduction by offering facility audits, design and technical assistance, and incentives for the installation of EE measures to qualifying customers served by SCE. The program targets facility owners in the Food & Kindred Products industry, ranging from small food companies to large food companies. The customers represent a broad spectrum of food producers, from bread and breakfast cereals to starch and sugar producers.
Primary & Fabricated Materials	**I (Third Party)**	The Primary & Fabricated Metals program plans to deliver energy savings and demand reduction by offering facility audits, design and technical assistance, and incentives for the installation of EE measures to qualifying customers served by SCE. Target customers for the program include facilities in the primary and fabricated metals industry.
Non-Metallic Minerals & Products	**I (Third Party)**	The Non-Metallic Minerals & Products program provides EE and demand reduction services to cement production plants, primary cement distribution terminals, and large ready-mix plants throughout SCE's service territory. Cement plants are part of the classification of manufacturers producing non-metallic minerals and products. This also includes bricks, ceramics, glass, and glass products.
Mid-Size Industrial	**I (Third Party)**	The Mid-Size Industrial Customers program provides mid-size industrial customers with detailed in-depth energy assessments that identify EE opportunities, accurately estimates potential savings and costs, and provides

Program Name	Applicable Sector	Program Description
Customers		a path leading to implementation. Primarily focusing on manufacturing and processing businesses using 2,000,000 kWh and below.

Qualified Commercial sector customers may also be eligible for additional programs and services such as On-Bill Financing, On-Bill Repayment, DR programs, time-of-use rates, and dynamic pricing.

SCE's Commercial EE programs offer integrated energy management solutions through strategic energy planning support, technical support services (such as facility audits and calculation and design assistance), and financial support (through rebates, incentives, and financing options).

3. Intervention Strategies

SCE will use the following intervention strategies to achieve the EE goals for its Commercial sector in its 2018-2025 EE portfolio:

- Financing
- Customer incentives
- Intelligent outreach
- Midstream and upstream incentives
- Partnering
- Quality assurance
- Single point-of-contact
- Strategic energy management, and
- Sustainable offerings.

Descriptions of these intervention strategies are included in the Portfolio Summary chapter (Section III.C). Appendix G contains a complete list of potential strategies, including continuation of existing strategies, and new strategies proposed by SCE for the Commercial, Industrial, and Agricultural sectors.

Table 27 identifies how the intervention strategies will be used to address specific trends and characteristics of the Commercial sector.

Table 27. Commercial Intervention Strategies to Address Sector Trends / Characteristics

Sector Trend / Characteristic	Sector Strategies
Interior lighting, HVAC, and refrigeration are historically the highest (dominant) end-uses in Commercial buildings.[196]	*Small / Mid-size:* Continue to focus on the midstream distributor program(s) for HVAC and lighting, while expanding to refrigeration. *Large:* Cover remaining end-uses (plus above end-uses) through customized offerings and longer-term Strategic Energy Management offering.
Nearly 80 percent of all energy usage occurs in retail, offices, restaurants, and groceries and food stores.[197]	*Small / Mid-size:* Expand direct install offering to cover national accounts customer segment. *Small / Mid-size:* Evolve the midstream distributor program through a coupons pilot to complement direct install expansion. *Large:* Focus on providing Strategic Energy Management savings to encompass behavior, retrocommissioning (RCx), and optimization measures that build on existing sector-wide penetration from the past.
The top 50 property management firms control nearly half of U.S. commercial office lease space, but they are neither the end users of energy in office buildings (tenants are), nor the beneficiaries of capital improvements (owners are).[198]	Enhance incentive delivery channels to allow building owners to directly apply for incentives.
For the Retail segment, most retailers want to be green, but being green must first be cost-justifiable. Many mid-size retailers lack the resources to manage efficiency opportunities despite potential cost reductions.[199]	Partner with distributors and other key partners to engage with retail customers and influence their efficiency-related purchasing decisions.
The top 80 percent of office electricity usage is from lighting, HVAC, and office equipment.[200]	• Offer a variety of downstream and midstream lighting and HVAC programs. • Expand current downstream office equipment measures with future midstream incentives.
For 43 percent of restaurants, energy efficiency is an important consideration for their next equipment purchase. However, energy efficiency does not rank among the top five factors	Re-tool non-incentive services such as lab testing to validate their role in shaping efficient equipment choices that meet customer needs, and then demonstrate influence in order to claim energy savings from the customer's resulting actions.

[196] Navigant Consulting, 2015 California Potential and Goals Study (Mar. 2015), *available at* http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5251.

[197] SCE internal Customer Service System customer database, Year-To-Date as of March 2016.

[198] Office Sector Snapshot, Esource, 2011attached as Appendix L.

[199] Retail Sector Snapshot, Esource, 2012, attached as Appendix N.

[200] Office Sector Snapshot, Esource, 2011, attached as Appendix L.

Sector Trend / Characteristic	Sector Strategies
influencing food service operators' equipment purchases.[201]	

4. Commercial Sector Metrics

As described in Section V.C.3, there are many barriers affecting the Commercial sector, varying across customer size. To overcome these barriers, SCE aims to:

- Increase the participation in EE by all three Commercial segments;
- Increase the average savings per project for Large and high-potential Mid-Size customers; and
- Increase EE awareness for Small and low-potential Mid-Size customers.

To measure progress against these goals, SCE has established the metrics identified in Table 28 for the Commercial sector. Please see Section III.I for SCE's portfolio metrics and approach to metrics in general. With the exception of the "Number of small commercial customers aware of EE" metric, which will be tracked on an annual basis, Commercial metrics will be tracked semi-annually. They will all be based on program tracking data.

[201] Restaurants Sector Snapshot, Esource, 2012, attached as Appendix M.

Table 28. SCE Proposed Commercial Sector Objectives and Metrics

Commercial Sector Challenges	SCE Objective	Intervention Strategies (Sample)	Metric
Large customers EE penetration is high relative to the other customer sizes, but could be improved. With this high penetration, increasing savings per project would be the focus of EE programs.	Increase participation rate from Large customers	• SEM • Customer Incentives • Commercial Financing	Number of new Large Commercial participants
	Increase per customer savings from Large customers		Claimable first year savings per project for Large Commercial
Mid-Size customers with high potential savings will be a focus of increasing savings per project. Mid-Size customers with low potential savings will be a focus of increasing participation.	Increase participation rate from Mid-Size customers	• Midstream EE Equipment • Commercial Financing • SEM • Intelligent Outreach • Direct Install	Number of new Mid-Size Commercial participants
			Claimable first year savings per project for Mid-Size Commercial
Small customers EE awareness could be increased, which could lead to increased participation.	Increase participation from new Small customers	• Midstream EE Equipment • Intelligent Outreach • Direct Install	Number of new Small Commercial participants
	Increase EE awareness of Small customers		Number of Small Commercial customers aware of EE

5. Pilots

SCE plans to leverage several current pilots, and to conduct new pilots, to support administration and foster continuous improvement of Commercial sector strategies. These pilots are discussed in more detail below.

a) LED Back-Lit Menu Board Pilot

The LED Back-Lit Menu Board Project is an effort to explore the market potential of the sign industry. Based on prior studies, there is a large savings potential from signs because the base case is generally low-efficiency fluorescent lamps and magnetic ballasts with peak usage patterns. The LED Back-Lit Menu Board Trial Program and Study has two main objectives:

- To explore new program delivery models and market channels for utility incentives and education, and

- To gather technical and market information to help inform a more accurate workpaper for LED menu board signs.

This pilot began in April 2015, and concluded at the end of August 2016 (results are expected in early 2017). The pilot conducted outreach via a third-party administrative support team that visited restaurants and other establishments to promote the incentive program and enroll restaurant owners. The goal was to complete 120 projects so the data could be used for workpaper development in early 2017 and establish energy saving value for this measure. This pilot may eventually be re-directed for midstream distributor delivery.

b) Advanced Lighting Control System (ALCS) Pilot

Beginning in September 2014, SCE implemented the ALCS Pilot targeting nonresidential customers. The initial strategy was to implement ALCS systems into 80 nonresidential installations. By 2015, the initial marketing and engagement efforts for the pilot were drawing great interest. The pipeline quickly grew from 16 participants at the end of 2015 to 40 potential participants by early 2016. This prompted SCE to redesign the pilot to a size of 40 projects with a modified pilot focus on ALCS's deep energy savings potential.

The SCE ALCS Pilot is expected to be completed in the second quarter of 2017. The pilot program results will be subject to program-funded early M&V evaluation using an independent third-party consultant. If successful, this pilot program can be redirected as an AB 802 High Opportunity Program Pilot to pursue to-code and above-code energy savings, targeting Large Commercial customers as a premium service. Properties with large energy savings potentials include commercial common areas, commercial-like spaces in industrial facilities, and warehouses.

c) Rapid Response Pilot

This pilot would target nonresidential customers (primarily Commercial and Industrial) to provide EE (and possibly other DERs) to help respond to emergency situations,

such as grid constraints.[202] When SCE experiences a situation that requires quick action, this pilot would supply a rapid response set of EE,[203] and potentially other DERs (e.g., DR and DG), to help address the situation. Though it is not a new concept to use DERs to address reliability constraints (e.g., Aliso Canyon, SONGS), SCE envisions this pilot demonstrating whether it is feasible and effective to have a pool of readily available resources that have been pre-approved by the Commission to address urgent electrical system needs.

SCE anticipates developing and proposing the pilot in 2017 for implementation beginning in 2018. During the pilot development phase, SCE will assess the effectiveness of previous DER activities in areas such as Aliso Canyon and SONGS-affected areas. SCE will quantify possible energy savings using approved methods, including possible Randomized Control Trial and Randomized Encouragement Designs. Another key pilot development activity in 2017 is the development of a white paper for vetting and feedback. The white paper will address target locations beyond current needs, methods to validate energy savings, cost-effectiveness evaluation, and an approach for a single funding source for all DER types in the pilot.

d) Reverse Distributor Bidding Option Pilot

As SCE continues to develop its midstream distributor programs, SCE expects to facilitate Large customer purchases of energy efficient products by allowing eligible customers to access these distributors to obtain price quotes or bids for projects. The goal of this pilot is to drive down the cost of EE equipment by having distributors compete for customer projects. SCE plans to develop a white paper to explore implementation details and to solicit

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[202] This proposed pilot aligns with the R.13-11-005 Phase III scope item: "Locational targeting or sourcing of energy efficiency, in coordination with the IDER rulemaking (R.14-10-003). This may also involve the need for urgent action for geographically-targeted energy efficiency, such as in the case of the unexpected closure of the San Onofre Nuclear Generating Station (SONGS) or the Aliso Canyon Natural Gas Storage field" at p. 10 of the Assigned Commissioner and Administrative Law Judge's Ruling and Amended Scoping Memorandum (Regarding Phase III of R.13-11-005), *available at* http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M169/K116/169116102.PDF.

[203] For example, SCE would want to quickly implement measures and increase incentives that have been pre-approved by the Commission if specific criteria occur.

feedback from possible participants. If the white paper concept is accepted, SCE will develop customer test cases to collect data. If the test cases prove out, SCE will propose additional pilot implementation details.

e) Nonresidential ZNE IDSM Retrofit Pilot

This ZNE pilot will target specific commercial businesses to achieve ZNE retrofit goals. The pilot will likely combine several DERs (e.g., EE, DR, and DG) and leverage IDSM funding. The initial deliverable for this pilot is a concept white paper, which will leverage work completed by the ZNE study team, to be delivered in 2017. The white paper will address target businesses, the methods to measure energy savings, a cost-effectiveness evaluation, and a proposal for a single funding source. If the white paper concept receives positive feedback, SCE will propose specific pilot details.

f) Low-Cost Customer Care Package & Customer Outreach Marketing Pilot

The purpose of this pilot will be to identify low-cost direct touch points for Small and Mid-size Commercial customers. Because these customer segments are targeted for distributor program service delivery, SCE wants to provide these customers a basic level of services such as a "Customer Care Package" and a customer outreach memo on an annual basis.

The concept of a Customer Care Package is not new. SCE's residential Home Energy Efficiency Survey (HEES) Program used such Customer Care Packages to encourage HEES mail-in participants to complete and return their in-home survey. The typical package may include slow-flow water faucets, window sealers, and other basic EE do-it-yourself items. The Commercial Customer Care Package would likely include similar items and might also include cost-effective LED bulbs and energy-efficient power strips. For the pilot, SCE will develop several demonstration packages and customer messages to evaluate their effectiveness. SCE's current estimate is that the pilot will cost $350 per customer. SCE plans to conduct many of the pilot development activities in 2017 for implementation in 2018.

E. Budget

Table 29 SCE's planned budget for the Commercial sector for 2018-2025. More details about SCE's budgeting process are described in the Portfolio Summary chapter (Section III.F).

Table 29. SCE Commercial Sector Proposed Budget 2018-2025

Program Year	Administration ($000)	Marketing ($000)	Direct Implementation ($000)	Incentives ($000)	Total Sector Budget ($000)
2015[204]	$5,098	$1,651	$35,863	$65,478	$108,090
2016[205]	$5,412	$906	$27,000	$54,811	$88,128
2017[206]	$5,055	$662	$27,782	$50,730	$84,229
2018	$5,168	$698	$30,783	$47,522	$84,171
2019	$5,323	$719	$31,706	$48,947	$86,696
2020	$5,430	$734	$32,341	$49,923	$88,430
2021	$5,321	$719	$31,694	$48,928	$86,662
2022	$5,481	$741	$32,645	$50,396	$89,262
2023	$5,645	$763	$33,624	$51,907	$91,939
2024	$5,815	$786	$34,633	$53,465	$94,698
2025	$5,999	$809	$35,672	$55,069	$97,538

F. Coordination and Integration

1. Key Partners

To successfully deliver EE in the Commercial sector, SCE interacts and integrates with the following key partners:

- *Regulatory and Legislative agencies:* Examples include the CPUC, CEC, and Federal and State governments.
- *PAs:* Other PAs have historically been key SCE partners in program development, implementation, and coordination. Examples include IOUs, RENs, and CCAs.
- *Advocacy Groups:* These are stakeholder groups that represent constituencies affected by EE. They include environmental advocacy groups, customer advocacy groups, and other stakeholders.

[204] Actual expenditures.
[205] Actual operating budget.
[206] Proposed budget.

- *Trade partners:* These are companies providing implementation and technical support for EE programs, including third-party implementers, or associations representative of industry participants.

2. Cross-PA Coordination

a) Statewide Coordination

The Commercial programs that are part of the new statewide administration model include:

- HVAC (Upstream and Midstream), the proposed statewide lead is SDG&E;
- Financing (New Finance Offerings), the proposed statewide lead is PG&E; and
- Savings By Design, the proposed statewide lead is SCE

Section III.E of the Portfolio Summary chapter includes a detailed description of the approach to statewide administration under the Commission's new definition for "statewide" And discusses the rationale for the IOU PAs' proposed leads for the statewide programs and subprograms. Table 30 provides additional details for the statewide Savings By Design program proposal.

Table 30. Statewide Savings By Design Program Details

Program Name: Savings By Design	
Program Description: The Savings By Design (SBD) Program is a statewide new construction EE program. It is open to nonresidential customers (Commercial, Industrial, or Agricultural buildings) or residential high-rise mixed-use buildings. The SBD Program provides design assistance and financial incentives to encourage builders to use sustainable energy-efficient building design and construction practices. It requires projects to achieve EE levels that are higher — by 10% or more — than the minimums prescribed by the State of California 2013 Building EE Standards (Title 24, Part 6) for new construction. The Title 24 minimum standards serve as the Reference Baseline, or starting point, from which energy savings can be determined. For nonresidential processes not regulated by Title 24, other industry standards — standard practice, existing regulation, or industry protocols — may also be used, when appropriate, to establish Reference Baselines which focus on the operating efficiency of replacement systems or equipment.	
Program Objectives:	**Potential Metrics**: • Percent increase in Integrated Design projects

• Establish the framework and support structure for a collaborative program participation experience that supports a comprehensive and integrated transformation into an efficient and effective statewide-administered program • Enhance and focus on supporting Whole Building Approach project opportunities by streamlining design and implementation activities with customers, design teams and partner trade associations, all with the common goal of developing and constructing the most energy-efficient buildings and communities with a focus on preparing the industry for ZNE targets • Streamline program application processes to enable an increased level of customer interest and participation especially to enhance Whole Building Approach participation	• Increase in energy savings by project or square footage • Water conservation (i.e., gallons of water saved)
Solicitation Strategy: Solicitations may include the following areas of activities: • Program Design and Implementation Services to solicit proposals with a focus on innovation, energy savings, cost-effectiveness, and performance. • Ancillary Services to solicit proposals to address application processing, project technical reviews, post-installation verifications, online project intake and management systems, and administrative functions. Solicitation parameters will include: • Purchase Order awards may be given to one or more entities depending on quality, innovation, cost-effectiveness, and what information is provided to give confidence that the bidder can perform as proposed. • Proposals can be comprehensive (e.g., may include application processing, project review,[207] and check issuance) or targeted to specific types of buildings (e.g., schools, refrigerated warehouses), specific cities, government facilities, etc.) Geographic coverage / specialty will also be considered. • Length of contract TBD if milestones and other conditions are satisfied.[208]	**Transition Timeline:** SCE will likely transition the major components of the SBD Program to the new Statewide approach in a mid- to late-2018 timeframe. Activities that should occur before launch of the program include solicitations, Implementation Plan development, and potential systems integration. Bidding for third party vendors will take place Q3 2017 as part of SCE's Solicitation for Innovation. PAs will collaborate to review bids prior to contracts being awarded. Depending on the type of proposals received, third-party implementation will take place Q2 or early Q3 2018

[207] Implementation Bidders proposing to take on these services will need to identify what structures will be established to avoid conflict of interest concerns. Implementers verifying their own projects is a conflict of interest concern.

[208] Develop a methodology that will enable "real-time" review of vendor's performance and develop options to replace any vendor not performing to the agreed-upon standard or milestone as quickly as possible. Current program policy allows a project up to 48 months to reach a level of completion enabling the verification of equipment installation or measurement of the estimated energy savings

• Scoring of proposals will be based on multiple criteria including a cost-effectiveness measurement. • Purchase Orders will primarily be pay-for-performance and will include milestones and conditions to assess the validity of performance claims, including real time performance and cost effectiveness.	

b) Regional Strategy Coordination

SCE plans to leverage regional, national, and state initiatives to help optimize the energy savings potential for California's Commercial segment. An integrated approach that supports benchmarking, workforce education and training, and sharing of industry best practices is critical for achieving long-term EE goals. SCE will continue to leverage C&S and ETP to develop new opportunities for the Commercial market and will collaborate with other PAs so that local programs complement, rather than conflict with, each other. SCE will also support RENs on Cross-cutting programs

3. Integration with Cross-Cutting Sector

a) Statewide ME&O Program

The Statewide ME&O Program provides umbrella marketing and mass media support for EE programs in California. The Commercial sector of SCE's EE portfolio will provide sector-specific marketing initiatives to support local needs. This will likely include the following activities:

- For Large customers, providing specific EE ME&O materials covering the suite of offerings and program requirements;
- For Mid-size and Small customers, providing an enhanced website to build awareness of midstream offerings;
- For participating distributors, providing appropriate marketing materials to promote EE or related DSM benefits to educate sales staff;

(using whole building metering). This makes a high performance level mandatory for any program implementer or service provider. Contract length is dependent upon program design response; contract length to be a minimum of 1 year.

- For WE&T-related items, promoting classes to improve knowledge and skills;
- Promoting EE services and benefits in appropriate trade association publications; and
- Annual distribution of the proposed Customer Care Package and Customer Outreach Marketing pilot if it proves effective.

b) Workforce Education and Training (WE&T)

The WE&T section of the Cross-Cutting Chapter provides more details on the program. This section provides high-level descriptions of how WE&T supports the Commercial sector.

For the Commercial sector, SCE expects to meet training needs by using established training facilities and leveraging relationships with trade organizations and associations and with colleges and universities. Training initiatives will also be informed in the future by random inspection and verification of installations and relevant ongoing support of Building Owner Certification Training (BOC) to continue to emphasize product and installation importance.

Key relevant WE&T initiatives in support of the Commercial sector include enhanced training for:

- Evolving HVAC offerings: Existing HVAC classes will require new modules due to shifting program elements tied to meter-based savings;
- AB 802 implementation capability: To-code savings opportunities require new training for newly eligible activities plus classwork on meter-based savings measurement;
- Strategic Energy Management (SEM) assistance. SEM's tie-in to long-term customer education will also result in the Commercial sector leveraging WE&T coursework and facilities; and

- As SCE transitions downstream offerings to midstream, there will be an increased focus on educating distributors through new and existing coursework about EE equipment.

c) Emerging Technology Program (ETP)

The ETP section of the Cross-Cutting Chapter provides more details on the program. This section provides high-level descriptions of how ETP supports the Commercial sector.

ETP aims to combine advanced, integrated solutions with traditional, standalone measures to reach the largest possible set of Commercial customers. To execute this approach, ETP will work upstream with product developers to integrate energy-saving attributes in the product design phase, motivate technology developers to build integrated solutions, and build on existing partnerships with the EPIC and PIER programs.

In terms of integrated solutions support, ETP plans to support emerging AB 802-related opportunities in the nonresidential sectors around the convergence of new data streams, connected building systems, and advanced control strategies with meter-based measurement and verification protocols. To help facilitate adoption of new integrated solutions, ETP is investigating advanced meter-based verification approaches, which directly measure energy savings of facility upgrades. Traditional methods can typically only offer an estimate based on field or laboratory testing. Thus, a meter-based approach offers utilities and Commercial customers a more accurate measure of energy savings while also identifying unexpected performance issues.

To support development of single-technology measures, ETP plans to continue to help advance IDSM initiatives, including DR-dispatchable batteries in buildings or fleets of EVs. Though these types of technologies are in their infancy, ETP contributes to utility efforts to enable stable market evolution to occur in a way that both benefits customers and leads to a more flexible, energy-efficient grid.

d) Codes & Standards (C&S)

The C&S section of the Cross-Cutting Chapter provides more details on the program. This section provides high-level descriptions of how C&S supports the Commercial sector.

An important way in which C&S supports the Commercial sector is its support for the CEC in continually developing the Title 24 building energy standards that, in alignment with the California Long-Term EE Strategic Plan (CLTEESP), will require all new commercial buildings to be ZNE by 2030. The C&S program will be coordinating with Commercial Sector to support the design and construction market actors involved with commercial new construction to achieve these ZNE goals.

C&S Program compliance improvement activities support the purchase and installation of HVAC systems, water-heating equipment, and plug loads so that they are installed in conformance with Title 24 and Title 20 standards. This is accomplished by supporting the CEC, building departments, distributors, dealers, and installation contractors to better understand applicable requirements.

The C&S program advocates for cost-effective higher-efficiency plug loads (including computers, multi-faceted reflector lamps, battery chargers, etc.) that save energy for Commercial customers. The C&S program provides this advocacy to both the CEC (for Title 20 regulations) as well as the US DOE to support their rulemaking process by providing technical, economic, market, and performance data to justify higher efficiency levels than what would otherwise occur.

4. EM&V Data Collection Needs and Anticipated Study Needs

SCE expects to require studies and internal customer data analyses to support its Commercial sector plans. Among the needs, listed in order of priority, are the following:

- Data segmentation to update new definitions of Public and other nonresidential sectors, and to support a nonresidential customer footprint service model;

- Periodic updates to relevant market characterization studies (given expected changes around AB 802 implementation and other drivers);
- One or more process evaluations related to the segmented delivery approach SCE is planning to implement. Because this segmentation approach is new, with more emphasis on working with distributors, a study of nonresidential distribution channels and touch points is important;
- Early feedback and M&V evaluations for implementation actions related to any pilots implemented in the future; and
- An updated commercial saturation survey study.

VI.

Industrial Sector

A. Industrial Sector Vision and Goals

SCE's vision for its Industrial sector is to achieve cost-effective energy savings by tailoring EE services based on customer size and behavior, piloting innovative EE solutions, and increasing education and awareness for customers and partners. California has established several policy goals that rely on increased energy efficiency. The Industrial sector accounts for 18 percent of electric usage in SCE's territory; thus, it plays an important role in achieving these state policies.

SCE's primary goal for the Industrial Sector is to achieve 98.91 GWh and 11.1 MW in electric energy savings in 2018. Table 31 shows SCE's annual savings forecasts for the Industrial sector through 2025 (including claimed savings for 2015 and projected savings for 2016 and 2017). These forecasts are based on the overall portfolio goals from D.15-10-028.

Table 31. SCE's EE Industrial Sector Savings Forecast 2018-2025

Program Year	Total kWh Sector Savings	Total kW Sector Savings
2015[209]	91,592,104	12,241
2016[210]	115,228,721	14,076
2017[211]	101,235,053	11,123
2018	98,910,312	11,103
2019	101,877,621	11,437
2020	103,915,174	11,665
2021	101,836,870	11,432
2022	104,891,976	11,775
2023	108,038,736	12,128
2024	111,279,898	12,492
2025	114,618,295	12,867

[209] Claimed savings.
[210] Projected savings.
[211] Projected savings.

B. Industrial Market Characterization

SCE's Industrial sector consists of approximately 50,000 service accounts. In 2015, these accounts used approximately 18 percent (15,000 GWh) of the total electricity consumption (81,000 GWh) in SCE's service territory. This is the third largest percentage of all sectors. Also in 2015, SCE's Industrial sector EE programs represented nine percent of the total EE portfolio budget and achieved eight percent of the portfolio's GWh savings.

1. Customer Landscape

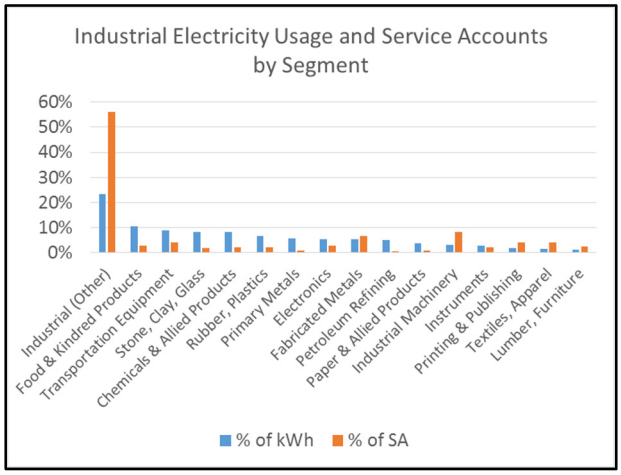
a) Segments and End Uses

SCE's Industrial sector consists of the following customer segments:

- Food & Kindred Products
- Petroleum Refining
- Transportation Equipment
- Paper & Allied Products
- Stone, Clay, and Glass
- Industrial Machinery
- Chemical & Allied Products
- Instruments
- Rubber & Plastics
- Printing & Publishing
- Primary Metals
- Textiles & Apparel
- Electronics
- Lumber & Furniture
- Fabricated Metals

Figure 19 displays the percentage of all Industrial usage and percentage of all Industrial service accounts (SAs) for each Industrial segment.

Figure 19. Industrial Sector Electricity Usage and SAs by Segment



Industrial sector customers use electricity for the following purposes:

- Lighting
- HVAC
- Process Refrigeration
- Process Heat, and
- Motors

b) Customer Types

As in the Commercial segment, SCE analyzes Industrial customer types based on their electricity demand. Table 32 identifies the characteristics of SCE's three Industrial sector segments.

Table 32. SCE Industrial Sector Segmentation for EE

Segment	Demand	# of Accounts	% of Sector kWh Usage	Avg kW per Account
Large	≥ 250 kW	2,000	85%	1,320 kW
Mid-Size	≥ 50 kW, < 250 kW	6,000	10%	110 kW
Small	< 50 kW	40,000	5%	11 kW

Large Industrial customers make up approximately five percent of all Industrial SAs, but are responsible for 85 percent of annual Industrial electricity consumption, indicating a high opportunity for savings per customer. Between 2013 and 2015, SCE installed

EE measures for 22 percent of all Large Industrial SAs. This shows a sizable opportunity for engaging Large Industrial customers on EE.

Mid-Size Industrial customers make up approximately 12 percent of Industrial SA, and are responsible for 10 percent of annual Industrial electricity consumption, indicating a small opportunity for savings per customer. From 2013 and 2015, SCE installed EE measures for eight percent of all Mid-Size Industrial customers, indicating that there are still opportunities for EE adoption among Mid-Size Industrial customers.

Small Industrial customers make up approximately 83 percent of Industrial SAs, but are only responsible for five percent of annual Industrial electricity usage, indicating a low savings opportunity per customer. Between 2013 and 2015, SCE installed EE measures for five percent of all Small Industrial SAs. While this indicates there are still many opportunities for EE among small Industrial customers, they are not the most cost-effective opportunities due to the high cost of reaching customers and low savings potential per customer.

2. <u>Industrial EE Potential</u>

Based on the most recent Potential Study, SCE has an achievable potential energy savings of 69 GWh, and an achievable demand savings of 6 MW, for the Industrial sector in 2018.[212] The achievable savings gradually decrease to 58 GWh and 5 MW by 2026.[213] The Industrial end-uses with highest achievable savings potential for SCE through 2026 are Machine Drive, Lighting, and HVAC.[214] These three end-uses account for 83 percent of the achievable energy savings potential and 82 percent of the achievable demand savings potential in 2018. The Industrial segments with the greatest potential for savings are Food Processing, Plastics, and Fabricated Metals. Appendix E shows the energy and demand savings market potential for SCE, by sector, for 2017-2026.

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[212] Navigant Consulting, AB802 Technical Analysis – Potential Savings Analysis, (Mar. 2016), *available at* http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=11189.

[213] *Id.*

[214] *Id.*

C. Industrial Sector Drivers

This section describes the drivers in the Industrial sector that shape the landscape of EE beyond the sector's market characteristics and potential. SCE describes various EE program trends and results of EM&V studies in this section.

1. Regulatory and Legislative Policies

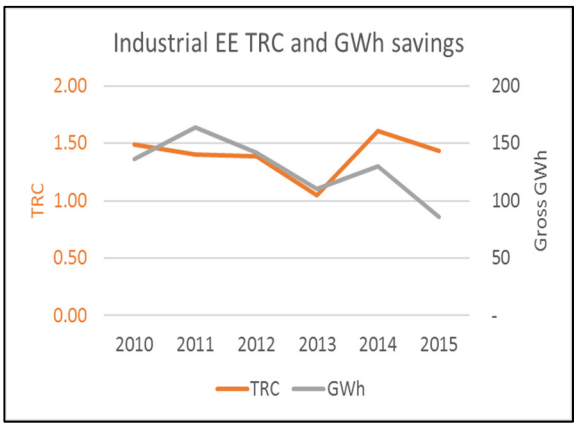
The policy drivers for the Industrial sector are largely the same as the general portfolio drivers described in the Portfolio Summary chapter (Section III.B.1).

2. Industrial Sector Portfolio and Market Trends

The Portfolio Summary chapter (Section III.B.2) describes the market trends applicable to all of the sectors in the EE portfolio. This section addresses portfolio and market trends specific to the Industrial sector.

As in the Commercial sector, the Industrial sector has seen a decrease in energy savings. However, unlike the Commercial sector, SCE has been able to maintain relatively high cost-effectiveness for Industrial sector projects. Figure 20 shows the decreasing savings and consistently positive cost-effectiveness for the Industrial sector between 2010 and 2015. Savings have decreased primarily because of changes in savings assumptions and industry standard practices.

Figure 20. SCE's Industrial Sector Energy Savings and Cost-Effectiveness 2010-2015[215]



During the same period of declining savings, as shown in Figure 21, Industrial sector expenditures have stayed reasonably consistent. Thus, it has become more expensive to achieve cost-effective energy savings.

Figure 21. SCE Industrial Sector Expenditures 2010-2015[216]

Several market trends have shaped SCE's Industrial EE portfolio. SCE discusses the market trends in three of the top Industrial customer segments (by electricity usage) below.

<u>Food & Kindred Products Trends:</u>[217]

- Food processing is the third-largest and one of the most energy-intensive manufacturing industries in California.

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[215] Data generated using information from: California Energy Efficiency Statistics website *available at* http://eestats.cpuc.ca.gov/Views/Documents.aspx, does not include industrial non-resource program costs embedded in cross-cutting programs (e.g., ET, WE&T, etc.) and C&S cost and benefits, as applicable.

[216] *Id*.

[217] SCE Food Processing Segment Optimization Plan, 2012, attached as Appendix O.

- 75 percent of electricity costs at food process facilities occurs in processing and assembly systems.
- California's food processing industry consumes more than 3.7 billion kWh of electricity.
- The Dairy sector and the Fruit and Vegetable sector are expanding.
- Chilling takes 79 percent of the total electricity usage in meat processing.
- The food processing industry has the following market trends (arranged in the order of importance to EE adoption):[218]
    - Certain food processing sub-segments, such as wineries and food canning, are seasonal. Facilities with seasonal operations tend to install EE equipment during the downtime of the year.
    - The food processing segment is very aware of energy costs affecting their bottom line and prefers payback of three years or less when making retrofits/installing new equipment.
    - The food processing industry has been slow to adopt new technologies as the industry is heavily regulated by food safety and sanitation standards. All EE upgrade activities must not jeopardize the facility's compliance with food safety and sanitation standards.

Plastics[219]

- The California plastics industry is the third largest manufacturing industry in the U.S. 1,500 businesses in California are involved with plastic and plastic products manufacturing. Of the 99 establishments in California engaged in plastic material and resin manufacturing:
    - 34 are located in Los Angeles County and 7 in Riverside County.

[218] Navigant Consulting and ASW Engineering: Measure, Application, Segment, Industry (MASI): Food Processing Industry, March 31, 2015, available at **http://www.calmac.org/publications/MASI_Food_Processing_Final_Report.pdf**, at p. v.

[219] SCE Manufacturing Segment Optimization Plan, 2012, attached as Appendix Q.

- Plastics are typically large industrial facilities.
- Plastics manufacturing uses various chemical, heating and cooling processes that require special equipment and technology.
- Because plastics are made from petrochemicals, their manufacturing facilities are often located near refineries to maximize efficiency of supply.

Petroleum Refining:[220]

- Electricity represents a relatively small portion of a refinery's energy consumption – making up only about three percent.
- Refiners depend on energy in their production process; they are particularly sensitive to energy costs as it erodes profit margins.
- Availability of uninterrupted electricity is critical to refineries, which are exploring options of cogeneration, mitigation technologies, power protection systems, and more.
- Petroleum refiners are the largest users of electricity in California manufacturing sector.

3. Industrial Sector Barriers and Challenges

There are several barriers specific to the Commercial, Industrial, and Agricultural sectors that have influenced SCE's EE portfolio proposals. Table 24 in the Commercial Sector chapter (Section V.C.3) describes the barriers specific to these sectors.

4. Lessons Learned From Past Cycles and EM&V Studies

Results of several Industrial sector evaluation studies provide further insight on these trends and provide recommendations that will inform SCE's future approach toward maintaining a cost-effective EE portfolio and enhancing the effectiveness of its custom

[220] *Id.*

engagement approaches. Key evaluation takeaways SCE leveraged to develop its Industrial portfolio include the following:

- As in the Commercial sector, differing priorities by customer size is identified as a barrier for the Industrial sector in multiple MASI studies. SCE intends to transition its entire nonresidential portfolio to size-specific service delivery
- Industrial sector programs, like all nonresidential programs, could improve gross realization and net realization rates through a common set of recommendations. SCE expects a combination of process improvements, along with customized services according to client footprint, to contribute to improved net and gross realization rates.
- As reported in several of Navigant's MASI studies, Industrial customers do not uniformly adopt Industry Standard Practices (ISPs).[221] Larger and more sophisticated industrial customers may have more resources and devote more attention to EE practices, but the same is not typical for Small and Mid-size customers. ISPs, however, are applied across an industry regardless of customer size. SCE plans to lead or support evaluation of applicability of ISPs to various customer types.[222]
- While EE benchmarking is important to all California customers, results may vary significantly based on specific industry segments. PAs may need a more targeted and specific benchmarking process for similar customers by industry inside and outside their territories, based on industrial output and specific

[221] Navigant Consulting and ASW Engineering. Measure, Application, Segment, Industry (MASI): New Opportunities for Oil and Gas Extraction and Produced Water Management and Recycling, March 31, 2015, pp. 29-30, *available at* http://www.calmac.org/publications/MASI_Oil_and_Gas_Final_Report.pdf

[222] SCE plans to monitor the recommendations of the ISP working group mandated by D.16-08-019 in hopes that future applicability of ISP is reconsidered and/or recommendations are made to research ISP applicability based on customer size or sophistication.

production volume rather than energy usage and physical size of the facilities.[223] SCE plans to address this through its participation in statewide efforts on the SEM program.

D. SCE's Approach to Achieving Industrial Sector Goals

SCE has developed its Industrial sector EE portfolio to accommodate the drivers, recognize the market trends, and address the challenges described above in order to meet sector goals. Historically, SCE has offered nonresidential programs designed for all customer types regardless of energy usage. With its 2018 portfolio, SCE will shift away from a "one size fits all" approach for the nonresidential sector to a segmented set of offerings that aligns EE service opportunities with customer energy usage patterns. Within each segment, SCE will use intervention strategies appropriate for customer size and behavior.

1. Industrial Sector Strategy Overview

SCE's customer segmentation approach for the Industrial sector divides customers into three segments: Large, Mid-Size, and Small. Though many factors can affect a customer's EE needs, energy savings opportunities are largely driven by a customer's energy demand. Thus, segmentation is based on energy demand (See Table 32, above, for details on SCE's Industrial customer segments).

Like the Commercial sector, for Large Industrial customers (and some Mid-Size), SCE will enhance its Direct-to-Customer offerings while introducing project implementation processes to improve gross and net realization rates. The Direct-to-Customer delivery approach will offer three tiers of customized service. These tiers are described in Section V.D.1 of the Commercial sector chapter.

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[223] Kennedy Jenks Consultants, Energy Use in Wastewater Treatment in the Food and Beverage Industry, October 15, 2010, pp. 67-73, *available at* http://www.calmac.org/publications/PGE_Energy-Use-WW-Treatment-Food-Bev-Industry_10-15-10_%28unlocked%29.pdf

For Small and Mid-Size customers, which are more limited in their EE resources and knowledge, SCE will leverage its midstream Distributor Delivery channels, which are described in more detail in Section V.D.1 of the Commercial sector chapter.

Table 33 identifies the specific delivery approaches by segment that SCE will employ for the Industrial customer segments.

Table 33. SCE Delivery Approaches by Industrial Sector Segment

Segment	Proposed Delivery Approaches
Large	• Direct-to-Customer tiers of service
Mid-Size	• Customers with high energy savings opportunities will be served through the Direct-to-Customer Delivery model • Majority of Mid-size customers reached by distributor delivery channels for above-code energy savings
Small	• Customers with limited energy savings opportunities addressed through Distributor Delivery model described above

SCE also plans to conduct several pilots with partners in the Industrial segment to test different delivery models, technology options, performance-based program design, and other elements. SCE expects future pilots to advance key strategic functions such as the segmented approach to delivering services, the capture of previously stranded potential opportunities, and the targeted deployment of EE resources.

SCE will also enhance training and education for informing Small and Mid-Size Industrial customers, which evaluation studies have found to be a barrier to EE measure installation.[224] These customers require additional training about measure choices compared to Large customers. SCE plans to increase collaboration with professional partners participating in WE&T programs to develop training content for industry needs and grow market exposure to key best practices.

[224] Navigant Consulting and ASW Engineering: Measure, Application, Segment, Industry (MASI): Food Processing Industry, March 31, 2015, *available at* http://www.calmac.org/publications/MASI_Food_Processing_Final_Report.pdf at p. 29.

2. Existing Programs and Services

To help overcome market barriers, SCE currently offers a number of programs for Industrial sector customers, including:

- Industrial core programs (Calculated, Deemed, and Midstream);
- Savings By Design Program for nonresidential new construction;
- Nonresidential HVAC program;
- Continuous Energy Improvement program (benchmarking); and
- Nonresidential third party-implemented programs.

Qualified Industrial sector customers may also be eligible for additional programs and services such as On-Bill Financing, On-Bill Repayment, DR, time-of-use rates, and dynamic pricing.

SCE's Industrial EE programs offer integrated energy management solutions through strategic energy planning support, technical support services (such as facility audits and calculation and design assistance), and financial support through rebates, incentives, and financing options. Table 26 in the Commercial Sector chapter describes the current sector offerings for the Commercial, Industrial, and Agricultural sectors.

3. Intervention Strategies

SCE will use the following intervention strategies to achieve the EE goals for its Industrial sector in its 2018-2025 EE portfolio:

- Financing
- Customer Incentives
- Intelligent Outreach
- Midstream / Upstream Incentives
- Partnering
- Quality Assurance
- Single-Point of Contact
- Strategic Energy Management (SEM), and

- Sustainable Offerings.

Descriptions of these intervention strategies are included in the Portfolio Summary chapter (Section III.C). Appendix G contains a complete list of potential strategies, including continuation of existing strategies, and new strategies proposed by SCE for the Commercial, Industrial, and Agricultural sectors.

Table 34 identifies how the intervention strategies will be used to address specific trends and characteristics of the Commercial sector.

Table 34. Industrial Intervention Strategies to Address Sector Trends and Characteristics

Sector Trend / Characteristic	Sector Tactic
The top 5% of Industrial service accounts use 85% of sector energy.[225]	• *Large*: Use SEM as a resource, cost-effective program that serves as a cornerstone of SCE's Large Industrial customer offering. • *Small / Mid-size*: Address remaining electricity usage via lessons learned from SEM to develop cohort, web-based, or other "SEM lite" options that cost-effectively provide similar services to smaller Industrial customers.
The top 75% of electricity usage is from the following segments: Industrial (Other), Food & Kindred Products, Transportation Equipment, Metals & Minerals, Chemicals, Plastics and Petroleum. A multi-pronged strategic approach is needed to tackle this diverse sector.[226]	Customize EE best practices to each customer segment's unique needs via SEM.
The top three Industrial end-uses by potential savings are Machine Drive, HVAC and Lighting.[227]	• *Large*: SEM will address these top end-uses, plus many others, while including additional behavior, retro-commissioning and operational interventions that create savings claims opportunities per AB 802 guidelines. • *SMB*: Custom applications of top end-uses will be delivered through "SEM-lite" services. • *SMB*: Additionally, midstream distributor approaches will deliver HVAC and Lighting technologies in the near term, and SCE will work with distributors to expand into general Machine Drive technologies. • *SMB*: Dispositions and ISP studies may be limiting measure availability and potential savings to select customer sizes. SCE plans to perform or support deeper analysis into past and future ISP guidance to clarify scope and enable the appropriate technologies to be offered to influence appropriate customer types.

[225] Based on SCE's analysis of data from its internal Customer Service System (CSS)

[226] *Id.*

[227] AB 802 Technical Analysis – Potential Savings Analysis, Navigant, March 2016, *available at* http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=11189

4. Metrics

As previously described, there are many barriers to achieving greater energy savings in the Industrial sector. One Industrial sector barrier is that SEM solves multiple Industrial customer problems, but its scale and adoption differs by customer size. To overcome this barrier, SCE wants to increase the use of SEM by Industrial customers. To measure progress against that goal, SCE will track the number of Small, Mid-size, and Large Industrial customers using SEM.

Further, there has historically been increased program participation from Large customer sizes vs. Mid-size and Small customers, so SCE aims to track the participation in EE by all three customer sizes.

Table 35 shows SCE's proposed metrics for the Industrial sector. The baseline value for these metrics will be from 2015 EE program tracking data and the source for evaluating the metric will be quarterly EE reports. Please see Section III.I for SCE's portfolio metrics and approach to metrics in general. The Industrial Sector metrics will be tracked semi-annually and will be based on program tracking data.

Table 35. SCE Proposed Industrial Sector Objectives and Metrics

Sector Barriers/Challenges	SCE Objective	Intervention Strategies	Metric
SEM solves multiple customer problems, but its scale and adoption differs by customer size.	Increase adoption of SEM by Small Industrial customers through a tailored approach	• SEM • Customer Incentives • Intelligent Outreach	Number of Small Industrial customers using SEM
	Increase adoption of SEM by Mid-Size Industrial customers through a tailored approach	• SEM • Customer Incentives • Intelligent Outreach • Financing	Number of Mid-Size Industrial customers using SEM
	Increase adoption of SEM by Large Industrial customers through a tailored approach	• SEM • Customer Incentives • Intelligent Outreach • Financing	Number of Large Industrial customers using SEM
Customer participation differs by customer size.	Increase participation rate from Small customers	• SEM • Customer Incentives • Intelligent Outreach	Number of new Small Industrial participants
	Increase participation rate from Mid-size customers	• SEM • Customer Incentives • Intelligent Outreach • Financing	Number of new Mid-Size Industrial participants
	Increase participation rate from Large customers	• SEM • Customer Incentives • Intelligent Outreach • Financing	Number of new Large Industrial participants

5. <u>Pilots</u>

SCE plans to leverage several current pilots, and to conduct new pilots, to support administration and foster continuous improvement of Industrial sector strategies. These pilots are discussed in more detail below.

a) <u>Performance Based Industrial Energy Management System Pilot</u>

Many SCE industrial customers utilize Energy Management Systems (EMS) in a variety of facility spaces. To date, it has been a challenge to measure non-hardware-based EE savings derived from EMS usage. SCE will propose a pilot program to explore

behavioral energy savings from EMS adoption. The initial pilot scale will be limited. If the concept proves to be effective, this concept can be scaled into a program.

SCE will also consider developing a performance-based pilot concept leveraging EMS (existing or new) in the customer facility. Rather than following the existing residential behavior protocol (that is, experimental design, comparative energy usage, and ex-post evaluation), this Industrial pilot will start with a meter-based measurement approach to document the necessary methods to estimate energy savings and performance-based payout and true-up. The pilot may offer an incentive for EMS installation if budget permits. It will also provide a performance incentive for goal setting and behavior energy savings, and may require a comprehensive energy audit for each project for a customer to be eligible. SCE plans to develop the pilot in 2018 and to complete no more than ten projects.

b) Industrial Strategic Energy Management (SEM) Pilot Projects

SEM uses executive contacts at major accounts to engage customer organizations from top to bottom, starting with a company-wide examination of necessary operational improvements to improve the company's net profits. Energy savings and conservation behaviors are often natural outcomes of these initiatives, but are not necessarily end goals. Tailored EE services are most appropriate for large customers who are interested in EE and capable of implementing it. The pilot would aim to test whether SEM achieves the following benefits:

- Allows customization of the energy management plan;
- Enables planning of activities over a meaningful time horizon for participating companies;
- Supports engagement of all tiers of decision making within a company to prove influence and attribution; and
- Provides a clear path to a customized solution to meet needs.

This pilot may be best suited for a performance-based incentive using a metering and measuring approach. As a pilot effort, SCE will limit the initial implementation to

no more than ten projects. This pilot may be implemented concurrently with the Industrial EMS pilot proposed above. SCE will develop the pilot in 2017 and use an RFP process to solicit bids from third parties. The pilot will likely be limited to fewer than 10 projects due to budget constraints.

c) Rapid Response Pilot

This is a pilot for both the Commercial and Industrial sectors and is described in Section V.D.5.c of the Commercial chapter.

d) Nonresidential ZNE IDSM Retrofit Pilot

This is a pilot for both the Commercial and Industrial sectors and is described in Section V.D.5.e of the Commercial chapter.

E. Budget

Table 36 shows SCE's planned budget for the Industrial sector for 2018-2025. More details about SCE's budgeting process are described in the Portfolio Summary chapter (Section III.F).

Table 36. SCE Industrial Sector Proposed Budget 2018-2025

Program Year	Administration ($000)	Marketing ($000)	Direct Implementation ($000)	Incentives ($000)	Total Sector Budget ($000)
2015[228]	$2,261	$933	$12,662	$9,778	$25,635
2016[229]	$1,810	$367	$10,398	$13,452	$26,027
2017[230]	$1,894	$350	$12,089	$11,520	$25,853
2018	$1,883	$348	$12,015	$11,362	$25,608
2019	$1,939	$358	$12,375	$11,703	$26,376
2020	$1,978	$365	$12,623	$11,937	$26,903
2021	$1,939	$358	$12,370	$11,698	$26,365
2022	$1,997	$369	$12,742	$12,049	$27,156
2023	$2,057	$380	$13,124	$12,411	$27,971
2024	$2,118	$391	$13,518	$12,783	$28,810
2025	$2,182	$403	$13,923	$13,167	$29,675

[228] Actual expenditures
[229] Actual operating budget
[230] Proposed budget

F. Coordination and Integration

1. Key Partners

To successfully deliver EE in the Industrial sector, SCE interacts and integrates with the following key partners:

- Regulatory and Legislative agencies: Examples include the CPUC, CEC, and federal and state governments.
- PAs: Other PAs are key SCE partners in program development, implementation, and coordination. Examples include IOUs, RENs, and CCAs.
- Advocacy Groups: These are stakeholder groups that represent constituencies that are affected by EE. They include environmental advocacy groups, customer advocacy groups, and other stakeholders.
- Trade partners: These are companies providing implementation and technical support for EE programs, or associations representative of industry participants. This includes third party implementers.

2. Cross-PA Coordination

a) Statewide Coordination

The Industrial programs that are part of the new statewide administration model include:

- HVAC – upstream and midstream (Proposed Statewide Lead: SDG&E);
- Savings by Design (Proposed Statewide Lead: SCE); and
- Financing: New Finance Offerings (Proposed Statewide Lead: PG&E).

Section III.E of the Portfolio Summary chapter includes a detailed description of the approach to statewide administration under the Commission's new definition for "statewide" And discusses the rationale for the IOU PAs' proposed leads for the statewide programs and subprograms.

b) Regional Strategy Coordination

SCE plans to leverage regional, national, and state initiatives to help optimize the energy savings potential for California's Industrial segment. An integrated approach that supports SEM, benchmarking, workforce education and training, and sharing of industry best practices is critical for achieving long-term EE goals. SCE plans to facilitate expanded discussions on important topics such as Industry Standard Practices and Baseline Calculation Methodologies. SCE will continue to leverage C&S and ETP to develop new opportunities for the industrial market and will collaborate with other PAs so that local programs complement, rather than conflict with, each other. SCE will also support RENs on Cross-cutting programs

3. Integration with Cross-Cutting Sector

a) Statewide ME&O

The Statewide ME&O Program provides umbrella marketing and mass media support for EE programs in California. The Industrial sector of SCE's EE portfolio will provide sector-specific marketing initiatives to support local needs. This will likely include the following activities:

- For Large Customers, specific EE ME&O materials covering the suite of offerings and program requirements;
- For Mid-size and Small Customers, an enhanced website to build awareness of midstream offerings;
- For participating distributors, appropriate marketing materials to promote EE or related DSM benefits to educate sales staff;
- For WE&T-related items, promotion of classes to improve knowledge and skills; and
- Promotion of EE services and benefits in appropriate trade association publications.

b) Workforce Education and Training (WE&T)

The Cross-Cutting chapter of the Business Plan provides more details on the WE&T program. This section provides high-level descriptions of how WE&T supports the Industrial sector.

For the Industrial sector, SCE expects to meet training needs by using established training facilities and leveraging relationships with trade organizations and associations and with colleges and universities. Training initiatives will also be informed in the future by random inspection and verification of installations and relevant ongoing support of Building Owner Certification Training (BOC) to continue to emphasize product and installation importance.

Key relevant WE&T initiatives in support of the Industrial sector include:

- Enhanced training for evolving HVAC offerings: Existing HVAC classes will require new modules due to shifting program elements tied to meter-based savings;
- AB 802 implementation capability: To-code savings opportunities require new training for newly eligible activities plus classwork on meter-based savings measurement; and
- SEM assistance: SEM's tie-in to long-term customer education will also result in the Industrial sector leveraging WE&T coursework and facilities.

c) Emerging Technology Program (ETP)

The Cross-Cutting chapter provides more details on the ETP program. This section provides high-level descriptions of how ETP supports the Industrial sector.

ETP aims to combine advanced, integrated solutions with traditional, standalone measures to reaching the largest possible set of Industrial customers. To execute this approach, ETP will work upstream with product developers to integrate energy-saving attributes

in the product design phase, motivate technology developers to build integrated solutions, and build on existing partnerships with the EPIC and PIER programs.

In terms of integrated solutions support, ETP plans to support emerging AB 802-related opportunities in the nonresidential sectors around the convergence of new data streams, connected building systems, and advanced control strategies, with meter-based measurement and verification protocols. To help facilitate adoption of new integrated solutions, ETP is investigating advanced meter-based verification approaches, which directly measure energy savings of facility upgrades. Traditional methods typically can typically only offer an estimate based on field or laboratory testing. Thus, a meter-based approach offers utilities and Industrial customers a more accurate measure of energy savings while also identifying unexpected performance issues.

To support development of single-technology measures, ETP plans to continue to help advance IDSM initiatives, including DR-dispatchable batteries in buildings or fleets of EVs. Though these types of technologies are in their infancy, ETP is contributing to utility efforts to enable stable market evolution in a way that both benefits customers and leads to a more flexible, energy-efficient grid.

d) Codes & Standards (C&S)

The Cross-Cutting chapter provides more details on the Codes & Standards program. This section provides high-level descriptions of how C&S supports the Industrial sector.

The C&S program's compliance improvement activities support the purchase and installation of HVAC systems, water-heating equipment, and plug loads so that they are installed in conformance with Title 24 and Title 20 standards by supporting the CEC, building departments, distributors, dealers, and installation contractors to understand applicable requirements better.

The C&S program advocates for cost-effective higher efficiency plug loads (including large process boilers, electric drive systems, chillers, and lighting) that save

energy for Industrial customers. The C&S program provides this advocacy to both the CEC (Title 20 regulations) and the US DOE to support their rulemaking process by providing technical, economic, market, and performance data to justify higher efficiency levels than what would otherwise occur.

4. <u>EM&V Data Collection Needs and Anticipated Study Needs</u>

SCE expects to require studies and internal customer data analyses to support its Commercial sector plans. Among the needs are the following:

- ISP Viability and Standardization - as indicated in several of the Navigant MASI industrial segment studies, large manufacturers may act differently than smaller ones. SCE proposes to do a follow-up study to the completed Navigant MASI studies that follows food processing, wastewater treatment, and cross-cutting pump and motor industrial applications to assess the necessary conditions to embrace and adopt ISP practices. The purpose of this study is to improve necessary customer communications to seek above-ISP energy savings and measures;
- Data segmentation to update new definitions of Public and nonresidential sectors, and to support a nonresidential customer footprint service model;
- Periodic updates to relevant market characterization studies (given expected changes around AB 802 implementation and other drivers);
- One or more process evaluations related to the segmented delivery approach SCE is planning to implement. Because this segmentation approach is new, with more emphasis on working with distributors, a study of nonresidential distribution channels and touch points is important; and
- Early feedback and M&V evaluations for implementation actions related to any pilots implemented in the future.

VII.

Agricultural Sector

A. Agricultural Sector Vision and Goals

SCE's vision for its Agricultural sector is to achieve cost-effective energy savings by tailoring EE services based on customer size and behavior, piloting innovative EE solutions, and increasing education and awareness for customers and partners. California has established several policy goals that rely on increased EE. The Agricultural sector accounts for approximately three percent of electric usage in SCE's territory and therefore has limited ability to contribute to the achievement of these state policies.

SCE's primary goal for the Agricultural Sector is to achieve 2.51 GWh and 0.61 MW in electric energy savings in 2018. Table 37 shows SCE's annual savings forecasts for the Agricultural sector through 2025 (including claimed savings for 2015 and projected savings for 2016 and 2017). These forecasts are based on the overall portfolio goals from D.15-10-028.

Table 37. SCE's EE Agricultural Sector Savings Forecast 2018-2025

Program Year	Total kWh Sector Savings	Total kW Sector Savings
2015[231]	35,988,457	7,321
2016[232]	8,425,713	998
2017[233]	3,056,925	615
2018	2,513,985	612
2019	2,589,405	630
2020	2,641,193	643
2021	2,588,369	630
2022	2,666,020	649
2023	2,746,001	668
2024	2,828,381	688
2025	2,913,232	709

[231] Claimed savings.
[232] Projected savings.
[233] Projected savings.

B. Agricultural Market Characterization

SCE's Agricultural sector consists of approximately 30,000 service accounts.[234] In 2015, these accounts used approximately three percent (2,000 GWh) of the total electricity consumption (81,000 GWh) in SCE's service territory. This is the smallest percentage of all sectors. Also in 2015, SCE's Agricultural sector EE programs represented four percent of the total EE portfolio budget and achieved three percent of the portfolio's GWh savings.

1. Customer Landscape

SCE has Agricultural customers throughout its territory, but the majority are located in the northern part of SCE's service territory. This includes counties such as Tulare, Kern, Ventura, and Kings.

a) Segments and End Uses

SCE's Agricultural sector consists of the following customer segments:

- Field & Seed Crops
- Fruit & Nut Crops
- Vegetables & Melons
- Livestock, Poultry, & Products, and
- Floriculture.

Agricultural sector customers use electricity for the following purposes:

- Lighting
- HVAC, and
- Process Machine Drive.

[234] Agricultural sector originally had ~50,000 SAs, but with the creation of the Public sector category, SCE has Agricultural accounts which will be part of the Public sector. For example, the Agricultural sector no longer includes water or wastewater facilities that are not specifically for Agricultural purposes. This has resulted in the transfer of approximately 20,000 SAs from the Agricultural sector to the Public sector.

b) Customer Types

SCE analyzes Agricultural customer types based on their electricity demand. Table 38 provides details about SCE's Agricultural customer segments.

Table 38. SCE Agricultural Sector Segmentation for EE

Segment	Demand	# of Accounts	% of Sector kWh Usage	Avg kW per Account
Large	≥250 kW	1,000	37%	480 kW
Mid-Size	≥50 kW, < 250 kW	8,000	49%	100 kW
Small	< 50 kW	41,000	14%	8 kW

Large Agricultural customers make up approximately two percent of all Agricultural SAs, but are responsible for 37 percent of annual Agricultural electricity consumption, indicating a high opportunity for savings per customer. Between 2013 and 2015, SCE installed EE measures for 59 percent of all Large Agricultural SAs. There is still some opportunity for engaging Large Agricultural customers on EE.

Mid-Size Agricultural customers make up approximately 16 percent of Agricultural SAs and are responsible for 49 percent of annual Agricultural electricity consumption, also indicating a high opportunity for savings per customer. From 2013 and 2015, SCE installed EE measures for 38 percent of all Mid-Size Agricultural customers, indicating that there are still opportunities for EE adoption among Mid-Size Agricultural customers.

Small Agricultural customers make up approximately 82 percent of Agricultural SAs, but are only responsible for 14 percent of annual Agricultural electricity usage, indicating a low savings opportunity per customer. Between 2013 and 2015, SCE installed EE measures for seven percent of all Small Agricultural SAs. While this indicates there are still many opportunities for EE among small Agricultural customers, they are not the most cost-effective opportunities due to the high cost of reaching customers and low savings potential per customer.

2. Agricultural EE Potential

Based on the most recent Potential Study, SCE has an achievable potential energy savings[235] of 15 GWh, and an achievable demand savings of 1 MW, for the Agricultural sector in 2018.[236] The annual achievable savings stay consistent through 2026.[237] The Agricultural end use with highest achievable savings potential for SCE through 2026 is Machine Drive.[238] This indicates that maintaining a sustainable pump-related program is important to achieving the potential in the Agricultural sector because customers utilize utility pump test services for assessing system optimization, implementing EE measures, and reducing waste within their operations and the grid.. The end use with the second highest potential is Process Refrigeration. These two end uses account for 100 percent of the achievable energy and demand savings in the Agricultural sector. The Industrial segments with the greatest potential for savings are Post-Harvest Processing (e.g., nut shelling), Dairies, and Irrigated Agriculture.[239] Appendix E shows the energy and demand savings market potential for SCE, by sector, for 2017-2026.

C. Agricultural Sector Drivers

This section describes the drivers in the Agricultural sector that shape the landscape of EE beyond the sector's market characteristics and potential. SCE describes various EE program trends and results of EM&V studies in this section.

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[235] Achievable Potential is defined as the cost-effective Technical Potential (by measure TRC) and then filtered to the EE savings that could be expected in response to specific levels of incentives and assumptions about policies, market influences, and barriers. Technical Potential is defined as the amount of energy savings that would be possible if the highest level of efficiency for all technically applicable opportunities to improve EE were taken. Technical potential represents the immediate replacement of applicable equipment-based technologies regardless of the remaining useful life of the existing measure.

[236] AB 802 Technical Analysis – Potential Savings Analysis, Navigant, March 2016, *available* at http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=11187

[237] *Id.*

[238] *Id.*

[239] Navigant Consulting, Energy Efficiency Potential and Goals Study for 2015 and Beyond, September 2015, *available at* http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5251

1. Regulatory and Legislative Policies

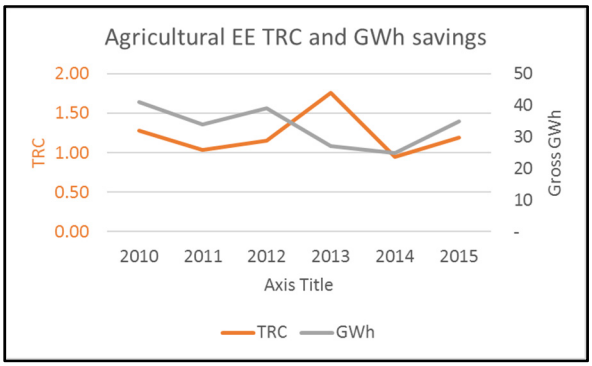
The policy drivers for the Agricultural sector are largely the same as the general portfolio drivers described in Section III.B.1 of the Portfolio Summary chapter.

2. Agricultural Sector Portfolio and Market Trends

Section III.B.2 of the Portfolio Summary chapter describes the market trends applicable to all of the sectors in the EE portfolio. This section addresses portfolio and market trends specific to the Agricultural sector.

The annual cost-effectiveness and energy savings in the Agricultural sector have remained relatively consistent between 2010 and 2015 (despite some minor fluctuations during that period). Figure 22 shows the savings and cost-effectiveness for the Agricultural sector between 2010 and 2015.

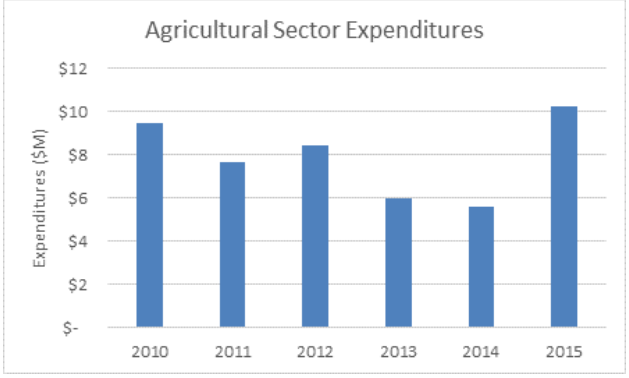
Figure 22. SCE's Agricultural Sector Energy Savings and Cost-Effectiveness 2010-2015[240]



During the same period, as shown in Figure 23, Agricultural sector expenditures have also stayed reasonably consistent.

[240] From EE Stats. Does not include agricultural non-resource program costs embedded in cross-cutting programs (e.g., ET, WE&T, etc.) and C&S cost and benefits, as applicable.

Figure 23. SCE Agricultural Sector Expenditures 2010-2015[241]



Additional Agricultural sector trends stem from the sustained California-wide drought, which has wide-ranging impacts on the agriculture industry. With less surface water available and underground water levels dropping, increased pumping is required to access these deeper water levels, which increases pumping costs and electricity needs. This increase in pumping could mean more adoption of pump tests and overhauls, but it is difficult to deliver these services cost-effectively due to reduced ability for PAs to claim savings for pump-related measures.[242] Also, water savings are much more important to farmers than electricity savings, exacerbating the existing EE engagement barrier in that electricity is a very small portion of farmers' costs. Additional Agricultural sector market trends are included in Appendix H.

3. Agricultural Sector Barriers and Challenges

There are several barriers specific to the Commercial, Industrial, and Agricultural sectors that have influenced SCE's EE portfolio proposals. Table 24 in the Commercial Sector chapter (Section V.C.3) describes the barriers specific to these sectors.

4. Lessons Learned from Past Cycles and EM&V Studies

Results of several Agricultural sector evaluation studies provide further insight on these trends and provide recommendations that will inform SCE's future approach to maintaining

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[241] *Id.*

[242] SCE has found that pump tests are a critical activity because they offer an opportunity for engagement with customers that often leads to implementation of pumping measures. SCE estimates that from 2010 to 2016, its pumping measures had 1,698 installations that resulted in approximately 130 million kWh and 21 MW in savings and that were influenced by SCE's Pump Test Program.

a cost-effective EE portfolio and enhancing the effectiveness of its custom engagement approaches. Key evaluation takeaways SCE leveraged to develop its portfolio include the following:

- As in the Commercial and Industrial sectors, serving customers with greater variation is recommended. SCE intends to transition its entire nonresidential portfolio to size-specific service delivery;
- California's agriculture and water supply systems have been challenged in recent years by prolonged drought periods. Groundwater remains in substantial overdraft in many areas, which has increased energy demands because additional well installations to tap lowered water tables result in more pumping. SCE aims to address these challenges by revamping its pump services programs and seeking integrated water-energy opportunities as part of a "Whole Farm" approach; and
- Crop fallowing as a result of water shortages is estimated to be approximately 80,000 acres relative to average water supply conditions, representing just below one percent of all irrigated acreage statewide.[243] About 90 percent is predominantly within the Central Valley area.[244] Adoption of more efficient irrigation technologies has been a constant barrier with significant impact on pumping energy usage. As SCE explores "Whole Farm" approaches, these and other sector-specific strategic initiatives are expected to rely heavily on trade association partnerships.

D. SCE's Approach to Achieving Sector Goals

SCE has developed its Agricultural sector EE portfolio to accommodate the drivers, recognize the market trends, and address the challenges described above in order to meet the

[243] Economic Analysis of the 2016 California Drought on Agriculture, Center for Watershed Sciences - UC Davis, August 15, 2016, *available at* https://watershed.ucdavis.edu/files/Executive_Summary_Drought_Report.pdf

[244] *Id*.

sector goals. Historically, SCE has offered nonresidential programs designed for all customer types regardless of energy usage. With its 2018 portfolio, SCE will shift away from a "one size fits all" approach for the nonresidential sector to a segmented set of offerings that aligns EE service opportunities with customer energy usage patterns. Within each segment, SCE will use intervention strategies appropriate for customer size and behavior.

1. Sector Strategy Overview

As in the Commercial and Industrial sectors, SCE's customer segmentation approach for the Agricultural sector divides customers into three segments: Large, Mid-Size, and Small. Though many factors can affect a customer's EE needs, energy savings opportunities are largely driven by a customer's energy demand. Thus, segmentation is based on energy demand (see Table 38, above, for details on SCE's Agricultural customer segments).

Like the Commercial sector, for Large Agricultural customers (and some Mid-Size), SCE will enhance its Direct-to-Customer offerings while introducing project implementation processes to improve gross and net realization rates. The Direct-to-Customer delivery approach will offer three tiers of customized service. These tiers are described in Section V.D.1 of the Commercial sector chapter.

For Small and Mid-Size customers, which are more limited in their EE resources and knowledge, SCE will leverage its midstream Distributor Delivery channels, which are described in more detail in Section V.D.1 of the Commercial sector chapter.

Table 39 identifies the specific delivery approaches, by segment that SCE will employ for the Agricultural customer segments.

Table 39. SCE Delivery Approaches by Agricultural Sector Segment

Segment	Proposed Delivery Approaches
Large	• Direct-to-Customer tiers of service
Mid-Size	• Customers with high energy savings opportunities will be served through the Direct-to-Customer Delivery model • Majority of Mid-size customers reached by distributor delivery channels for above-code energy savings
Small	• Customers with limited energy savings opportunities addressed through Distributor Delivery model described above

SCE also plans to conduct several pilots with partners in the Agricultural segment to test different delivery models, technology options, performance-based program design, and other elements. SCE expects future pilots to advance key strategic functions such as the segmented approach to delivering services, the capture of previously stranded potential opportunities, and the targeted deployment of EE resources.

SCE will also enhance the role of training and education for informing Small and Mid-Size Agricultural customers, which previous SCE internal evaluations have recommended. These customers require additional training and education because they have more constraints (relative to Large customers) related to energy management resources. SCE plans to increase collaboration with professional partners participating in WE&T programs to develop training content for industry needs and grow market exposure to key best practices.

2. <u>Existing Programs and Services</u>

To help overcome market barriers, SCE currently offers a number of programs for Agricultural sector customers, including:

- Agricultural core programs (Calculated, Deemed, and Midstream);
- Savings By Design Program for nonresidential new construction;
- SCE Pump Efficiency Services (a.k.a, Pump Test Services);
- Nonresidential HVAC program; and
- Continuous Energy Improvement (CEI) program (benchmarking).

Qualified Agricultural sector customers may also be eligible for additional programs and services such as On-Bill Financing, On-Bill Repayment, DR, and dynamic pricing.

SCE's nonresidential EE programs offer integrated energy management solutions through strategic energy planning support; technical support services (such as facility audits and calculation and design assistance); and financial support through rebates, incentives, and financing options. Table 26 in the Commercial Sector chapter describes the current sector offerings for the Commercial, Industrial, and Agricultural sectors.

3. Intervention Strategies

SCE will use the following intervention strategies to achieve the EE goals for its Agricultural sector in its 2018-2017 EE portfolio:

- Financing;
- Customer Incentives;
- Intelligent Outreach;
- Midstream/Upstream Incentives;
- Partnering;
- Quality Assurance;
- Single-Point of Contact;
- Strategic Energy Management; and
- Sustainable Offerings.

Descriptions of these intervention strategies are included in the Portfolio Summary chapter (III.C). Appendix G contains a complete list of potential strategies, including continuation of existing strategies, and new strategies proposed by SCE for the Commercial, Industrial, and Agricultural sectors.

Table 40 identifies how the intervention strategies will be used to address specific trends and characteristics of the Commercial sector.

Table 40. Agricultural Intervention Strategies to Address Sector Trends / Characteristics

Sector Trend / Characteristic	Sector Tactic
California produces about half of U.S. grown fruits, nuts, and vegetables, and its agricultural abundance includes more than 400 commodities.[245]	• *Large:* Use SEM as a resource, cost-effective program that serves as a cornerstone of SCE's Large Agricultural customer offering. • *Small / Mid-size:* Address remaining electricity usage via lessons learned from SEM to develop cohort, web-based, or other "SEM lite" options that cost-effectively provide similar services to smaller Agricultural customers.
Billion-dollar commodities by value include milk and cream, almonds, grapes, and cattle/calves.[246]	• *Large:* Adopt a "Whole Farm" approach to bundling EE education and programs into a broader suite of support programs (e.g., electricity, water, gas, soil quality, etc.) that customize EE best practices to each customer segment's unique needs.
Approximately 40 percent of energy used for farming is used to move water.[247]	• Evolving pumping-related offerings to be cost-effective and cost-efficient will be key to maintaining this offering.
Energy accounts for less than 5 percent to 10 percent of total costs for many farms.[248]	• Engage with farmers' trusted partners (e.g., trade associations) to help bring EE to the forefront of customers' priorities. • Bundle EE education and programs through a "Whole Farm" approach to help raise the importance of EE to farmers by integrating with other crop production concerns.
Emerging markets (particularly Indoor Agriculture, including recreational cannabis) can dramatically increase the Agricultural sector's electricity usage.[249]	• Monitor changes to state laws around legalizing recreational cannabis and leverage research on EE programs' best practices in reaching this new market.

4. Metrics

As described previously, there are many barriers to achieving greater energy savings in the Agricultural sector. One Agricultural-specific barrier is that irrigation systems are a significant factor in pumping energy usage, yet high-efficiency systems have ongoing barriers to adoption. To overcome this barrier, SCE wants to increase the adoption of high-efficiency irrigation systems by offering customers a water / energy co-funded program that influences farms to transition to higher-efficiency irrigation systems. To measure progress against this goal, SCE will track Agricultural customers who participate in a “Whole Farm” program, after that program is evaluated for cost-effectiveness and implemented.

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[245] California Agricultural Statistics Review, California Department of Food & Agriculture, 2014-2015.

[246] *Id*.

[247] SCE Internal Agricultural Segment Overview, 2012, Attached as Appendix P

[248] *Id.*

[249] Jennifer Oldham, As Pot Growing Expands, Electricity Demands Tax U.S. Grids, Bloomberg (Dec. 21, 2015), *available at* https://www.bloomberg.com/news/articles/2015-12-21/as-pot-growing-expands-power-demands-tax-u-s-electricity-grids.

Another Agricultural-specific barrier is that it is costly for SCE to develop one-on-one relationships with farmers to provide EE education and services. To overcome this barrier, SCE wants to enable Agricultural customers to engage with a trusted advisor for EE. To measure progress against this goal, SCE will track the percentage of Agricultural customers reporting that they have a trusted advisor for EE education and services.

Further, there has historically been increased program participation from Large customer sizes vs. Mid-size and Small customers, so SCE aims to track the participation in EE by all three customer sizes. Please see Section III.I for SCE's portfolio metrics and approach to metrics in general. With the exception of the "Number of Agricultural customers aware of EE" metric, which will be tracked annually, the Agricultural Sector metrics will be tracked semi-annually. They will all be based on program tracking data.

Table 41 shows SCE's proposed metrics for the Agricultural sector.

Table 41. SCE Proposed Agricultural Sector Objectives and Metrics

Sector Barriers/Challenges	SCE Objective	Intervention Strategies	Metric
Irrigation systems are a significant factor in pumping energy usage yet high-efficiency systems have ongoing barriers to adoption.	Increase number of Agricultural customers who are leveraging best irrigation practices.	• Customer Incentives • Intelligent Outreach • Financing	Number of Agricultural customer participating in a "Whole Farm" approach
It is costly to develop one-on-one relationships with farmers to provide EE education and services.	Increase leveraging of trusted Agricultural partners (e.g., trade associations) or other engagement strategies to promote EE awareness among Agricultural customers	• Intelligent Outreach	Number of Agricultural customers aware of EE
Customer participation differs by customer size.	Increase participation rate from Small customers.	• Customer Incentives • Intelligent Outreach	Number of new Small Agricultural participants.
	Increase participation rate from Mid-size customers.	• Customer Incentives • Intelligent Outreach • Financing	Number of new Mid-Size Agricultural participants.
	Increase participation rate from Large customers.	• Customer Incentives • Intelligent Outreach	Number of new Large Agricultural participants.

Sector Barriers/Challenges	SCE Objective	Intervention Strategies	Metric
		• Financing	

5. Pilots

SCE's anticipated pilot activity for the Agricultural sector focuses on alignment with applicable Electric Program Investment Charge (EPIC) program initiatives, which will support investments in clean energy technologies. The pilot initiatives in which SCE plans to participate include the following:

a) Pilot Self-Sustaining, Replicable Local Planning, Permitting, and Financing Model to Accelerate Adoption of Water and Energy-Efficient Technologies

This pilot is designed to facilitate modifications to local government policies and procedures to directly encourage and support adoption of new technologies for the purpose of drought resilience. The pilot will use a multi-stakeholder process structured to:

- Develop a Drought Resilience Plan, goals, and objectives for Tulare County,
- Match technologies to water goals and objectives,
- Identify barriers to adoption,
- Recommend/implement changes to local plans and processes (e.g., General Plans) and to local permits to streamline adoption of high-priority water strategies and technologies,
- Bundle high-priority technologies into packages that include financing, and
- Create tools, templates & replicable models.

SCE's role will be as lead partner in identifying and evaluating water and energy-efficient technologies that fit for the region's Drought Resilience Plan. The pilot was approved by the CEC in December 2016 and is anticipated to start in 2017.[250]

b) Irrigation Advisor Pilot

The purpose of this pilot is to assess the potential of integrating smart electric meter data with water meters to optimize pump effiencies and crop yields. POwWOw Irrigation Advisor™ is a computer application that supplies weekly irrigation schedules and regular normalized difference vegetation index (NDVI) field images to monitor field performance. POwWOw Pump Monitor™ is a computer application that turns an existing energy smart meter into a water meter. It is ideal for maintaining distribution uniformity and irrigating across soil types for optimal yield. Pump Monitor™ and Irrigation Advisor™ act together as a program that continuously monitors irrigation pumps and fields and tracks the results. The technology also has the capability to monitor pumps to detect anomalies in the pump system. This pilot was approved by the CEC in December 2016 and is anticipated to start in 2017.[251]

E. Agricultural Sector Budget

Table 42 shows SCE's planned budget for the Agricultural sector for 2018-2025. More details about SCE's budgeting process are described in the Portfolio Summary chapter (Section III.F).

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[250] California Energy Commission Notice of Proposed Award, *available at* http://www.energy.ca.gov/contracts/GFO-16-305_NOPA_Phase_01.pdf

[251] *See Id.*

Table 42. SCE Agricultural Sector Proposed Budget 2018-2027

Program Year	Administration ($000)	Marketing ($000)	Direct Implementation ($000)	Incentives ($000)	Total Sector Budget ($000)
2015[252]	$214	$17	$3,650	$3,529	$7,410
2016[253]	$297	$17	$2,797	$1,450	$4,561
2017[254]	$254	$17	$2,741	$464	$3,477
2018	$247	$17	$2,669	$372	$3,305
2019	$255	$17	$2,749	$383	$3,404
2020	$260	$18	$2,804	$391	$3,472
2021	$255	$17	$2,748	$383	$3,403
2022	$262	$18	$2,830	$394	$3,505
2023	$270	$18	$2,915	$406	$3,610
2024	$278	$19	$3,003	$419	$3,718
2025	$287	$20	$3,093	$431	$3,830

F. Agricultural Sector Coordination and Integration

1. Key Partners

To successfully deliver EE in the Agricultural sector, SCE interacts and integrates with the following key partners:

- Regulatory and Legislative agencies: Examples include the CPUC, CEC, and federal and state governments.
- PAs: Other PAs are key SCE partners in program development, implementation, and coordination. Examples include IOUs, RENs, and CCAs.
- Advocacy Groups: These are stakeholder groups that represent constituencies that are affected by EE. They include environmental advocacy groups, customer advocacy groups, and other stakeholders.

[252] Actual expenditures.
[253] Actual operating budget.
[254] Proposed budget.

- Trade partners: These are companies providing implementation and technical support for EE programs, or associations representative of industry participants. This includes third-party implementers.

2. Cross-PA Coordination

a) Statewide Coordination

The Agricultural programs that are part of the new statewide administration model include:

- HVAC – upstream / midstream (Proposed Statewide Lead: SDG&E);
- Savings by Design (Proposed Statewide Lead: SCE);
- Financing: New Finance Offerings (Proposed Statewide Lead: PG&E); and
- Indoor Agriculture Downstream Pilot (Proposed Statewide Lead: PG&E).

Section III.E of the Portfolio Summary includes a description of the approach to statewide administration under the Commission's new definition for "statewide" and discusses the rationale for the IOU PAs' proposed leads for the statewide programs and subprograms.

b) Regional Strategy Coordination

SCE plans to leverage regional, national, and state initiatives to help optimize the energy savings potential for California's Agricultural segment. An integrated approach that supports benchmarking, workforce education and training, and sharing of industry best practices is critical for achieving long-term EE goals. SCE will continue to leverage C&S and ETP to develop new opportunities for the Agricultural market and will collaborate with other PAs so that local programs complement, rather than conflict with, each other. SCE will also support RENs on Cross-cutting programs.

SCE's Pump Test team has collaborated with RENs on pump tests and the WISE Pilot. Much of this collaboration is related to pump measures for municipal water

applications in the Public Sector, in which pump test data serves as the foundation for expanded measures, such as system optimization.

3. Integration with the Cross-Cutting Sector

a) Statewide ME&O

The Statewide ME&O Program provides umbrella marketing and mass media support for EE programs in California. The Agricultural sector of SCE's EE portfolio will provide sector-specific marketing initiatives to support local needs. This will likely include the following activities:

- For Large Customers, specific EE ME&O materials covering the suite of offerings and program requirements;
- For Mid-size and Small Customers, an enhanced website to build awareness of midstream offerings;
- For participating distributors, appropriate marketing materials to promote EE or related DSM benefits to educate sales staff;
- For WE&T-related items, promotion of classes to improve knowledge and skills; and
- Promotion of EE services and benefits in appropriate trade association publications.

b) Workforce Education and Training (WE&T)

The Cross-Cutting chapter provides more details on the WE&T program. This section provides high-level descriptions of how WE&T supports the Agricultural sector.

For the Agricultural sector, SCE expects to meet training needs by using established training facilities and leveraging relationships with trade organizations and associations and with colleges and universities. Training initiatives will also be informed in the future by random inspection and verification of installations and relevant ongoing support of Building Owner Certification Training (BOC) to continue to emphasize product and installation importance.

Key relevant WE&T initiatives in support of the Agricultural sector include enhanced training for evolving HVAC offerings; AB 802 implementation capability; and strategic energy management assistance. Existing HVAC classes will require new modules due to shifting program elements potentially tied to meter-based savings. To-code savings opportunities require new training for newly eligible activities plus classwork on meter-based savings measurement. SEM's tie-in to long-term customer education will also result in the Agricultural sector leveraging WE&T coursework and facilities. Finally, as SCE transitions downstream offerings to midstream, there will be an increased focus on educating distributors through new and existing coursework about EE equipment.

c) Emerging Technology Program (ETP)

The Cross-Cutting chapter provides more details on the ETP program. This section provides high-level descriptions of how ETP supports the Agricultural sector.

ETP aims to combine advanced, integrated solutions with traditional, stand-alone measures in order to reach the largest possible set of Agricultural customers. To execute this approach, ETP will work upstream with product developers to integrate energy-saving attributes in the product design phase, motivate technology developers to build integrated solutions, and build on existing partnerships with the EPIC and PIER programs.

In terms of integrated solutions support, ETP plans to support emerging AB 802-related opportunities in the nonresidential sectors around the convergence of new data streams, connected building systems, and advanced control strategies with meter-based measurement and verification protocols. To help facilitate adoption of new integrated solutions, ETP is investigating advanced meter-based verification approaches, which directly measure energy savings of facility upgrades. Traditional methods typically can typically only offer an estimate based on field or laboratory testing. Thus, a meter-based approach offers utilities and Agricultural customers a more accurate measure of energy savings while also identifying unexpected performance issues.

To support development of single-technology measures, ETP plans to continue to help advance IDSM initiatives, including DR-dispatchable batteries in buildings or fleets of EVs. Though these types of technologies are in their infancy, ETP is contributing to utility efforts to enable stable market evolution in a way that both benefits customers and leads to a more flexible, energy-efficient grid.

d) Codes & Standards (C&S)

The Cross-Cutting chapter provides more details on the Codes & Standards program. This section provides high-level descriptions of how C&S supports the Agricultural sector.

C&S Program compliance improvement activities support the purchase and installation of HVAC systems, water-heating equipment, and plug loads so that they are installed in conformance with Title 24 and Title 20 standards. This is accomplished by supporting the CEC, building departments, distributors, dealers, and installation contractors in better understanding applicable requirements.

The C&S program advocates for cost-effective higher-efficiency plug loads (such as pumps, motors, electric drive systems, refrigeration, drying equipment, and lighting) that save energy for Agricultural customers. The C&S program provides this advocacy to both the CEC (Title 20 regulations) as well as the US DOE to support their rulemaking process by providing technical, economic, market, and performance data to justify higher efficiency levels than what would otherwise occur.

4. EM&V Data Collection Needs and Anticipated Study Needs

SCE expects to require studies and internal customer data analyses to support its Agricultural sector plans. Among the needs, listed in order of priority, are the following:

- Data segmentation to update new definitions of Public and other nonresidential;
- Periodic updates to relevant market characterization studies (given expected changes around AB 802 implementation and other drivers);

- One or more process evaluations related to the segmented delivery approach SCE is planning to implement. Because this segmentation approach is new, with more emphasis on working with distributors, a study of nonresidential distribution channels and touch points is important; and
- Early feedback and M&V evaluations for implementation actions related to any pilots implemented in the future.

VIII.

Public Sector

A. Public Sector Vision and Goals

SCE's vision for the Public sector is to cost-effectively increase customer adoption of energy efficiency (EE) improvements and simplify program participation for customers. SCE's Public sector EE portfolio will focus on enhancing the customer experience and simplifying program processes to better align with customer needs. SCE plans to better enable Public sector customers to participate in EE and DSM programs by deploying a diverse offering of programs and services that provide financial and procurement solutions, relevant energy usage information, and customer education. By 2027, the Public sector is projected to have the financial and technical means to determine the energy usage of all public buildings In addition, Public sector customers should also have an in-depth knowledge of their facilities' energy usage and building technologies and the data analytics capability to determine required retrofits and retro-commissioning needs. For projects that require incentives, meter-based savings should be the primary means of incentivizing and calculating EE savings.

While the CA Long-term Energy Efficiency Strategic Plan (Strategic Plan) has not been updated since 2011 and was developed for only the local government segment of the Public sector, several of the goals outlined remain applicable to the Public sector into 2027. SCE will continue to empower Public sector customers to promote higher EE standards, promote code compliance, and lead by example. In addition, SCE will drive Public sector programs to have a greater focus on codes and standards compliance over incentives in coordination with the Codes and Standards program.

SCE will also continue to focus on providing integrated energy management solutions for Public sector customers, incorporating EE, DR, energy storage, EVs, renewables, and other types of DSM solutions, as appropriate. SCE will also work to provide cost-effective programs through program modifications, such as, regionalization of partnerships, consistency of program

offerings, transition of certain programs to statewide implementation, and solicitation of third party-implemented programs.

Achieving SCE's vision will help Public sector customers contribute to the state goals of reducing greenhouse gas (GHG) emissions, improve SCE's ability to manage grid reliability and reduce the need to build new energy infrastructure. Achieving SCE's vision will also move the Public sector closer to EE market transformation, in which, with the exception of complex or novel projects, Public sector customers will no longer be reliant on utility support to develop and implement EE projects. It will also continue to enable and expand on Public sector customers' development and retrofits of existing structures to be ZNE over the next ten years.

SCE's primary goal for the Public Sector is to achieve 28.44 GWh and 4.2 MW of electric energy savings in 2018. Table 43 shows SCE's annual savings forecasts for the Public sector through 2025 (including claimed savings for 2015 and projected savings for 2016 and 2017). These forecasts are based on the overall portfolio goals from D.15-10-028. These savings estimates take into account full implementation of the Public Sector High Opportunity Projects or Programs (HOPPs) Program (discussed below) and the additional new segments, such as water / wastewater, K–12, and public healthcare.

Table 43. SCE's EE Public Sector Savings Forecast 2018-2025

Program Year	Total kWh Sector Savings	Total kW Sector Savings
2015[255]	30,837,743	3,721
2016[256]	32,721,359	2,921
2017[257]	36,334,556	4,099
2018	28,443,223	4,213
2019	29,296,520	4,339
2020	29,882,450	4,426
2021	29,284,801	4,337
2022	30,163,345	4,467
2023	31,068,246	4,601
2024	32,000,293	4,739
2025	32,960,302	4,882

B. Market Characterization

The Public sector is comprised of government agencies (local governments, special districts, and state and federal agencies) and education entities (colleges, universities, libraries, and K–12 schools), and consists of approximately 75,000 service accounts in eight climate zones. Traditionally, the Public sector has been classified as part of the Commercial sector. However, due to its unique attributes, the Commission has ordered that the Public sector be treated in a separate chapter in the business plan.[258] The Public sector is unique because its customers are in a position to influence, and in some instances regulate, their communities, adhere to a unique public decision-making process, possess a vast amount of institutional knowledge, and are permanent entities. Table 44 identifies several differences between common Public and Commercial sector customers. For example, Commercial customers are often farther along in their energy management practices than Public customers that are intended to serve the public and to minimize risk because public entities require approval of councils or boards for all financial decisions.

[255] Claimed savings.
[256] Projected savings.
[257] Projected savings.
[258] D.15-10-028, p. 47.

Table 44. Public Sector vs. Commercial Sector Customers

Public Sector Customer	Commercial Sector Customer
For public good	For profit
Risk-averse	Calculated risk
Investments based on benefits to public good	Investments based on ROI
Long approval process, often requiring council / board approvals	Approval granted when business case is proven
Complex financing mechanisms	Financial tools easier to access
Perpetual maintenance	Replace on business case
Tax-based revenue generation	Sales-based revenue generation
Subject to political changes	Relatively insulated from political changes

Currently, Industry Standard Practice (ISP) is applied to the Public sector in the same way that it is applied to the Commercial sector. However, the technical and financial resources available to Public sector energy management systems (EMS) are not as substantial as those of the Commercial sector. For example, a public building's computer server system is usually less advanced than it would be in a commercial building. Additionally, Public sector investments are based on public good and on providing essential services at a minimal cost. But minimizing costs often means that more advanced EE work for the Public sector goes unrealized because it is expensive.

Currently, the baseline for EE projects are Title 24 standards, which is much higher than the standards met by existing buildings in both the Commercial and Public sectors. However, due to the prevalence in the Public sector to defer maintenance and continue the use (rather than replacement) of existing buildings, Public sector buildings are often farther below Title 24 standards than Commercial sector buildings.[259] Consequently, the cost to bring Public sector buildings up to code and beyond continues to increase as Title 24 standards aggressively increase

[259] For example, according to the California State University's (CSU) Support Budget 2015-2016, there is a backlog of $1.8 billion in deferred maintenance in the CSU system. *See* Support Budget 2015-2016, California State University, at p.25 (Nov. 2014), *available at* https://www.calstate.edu/budget/fybudget/2015-2016/executive-summary/documents/2015-16-Support-Budget.pdf.

to meet California's clean energy policy goals, such as ZNE. As a result, there is stranded energy savings potential in the Public sector. In order to incentivize Public sector entities to meet or exceed Title 24 code requirements, PAs need to offer EE incentives and services. Implementation of AB 802 will capture some of the stranded EE potential through the incorporation of meter-based savings, but additional work should be done to modernize and improve the efficiency of Public sector buildings.

1. Customer Landscape

a) Segments

Table 45 shows the segments and sub-segments in the Public sector.

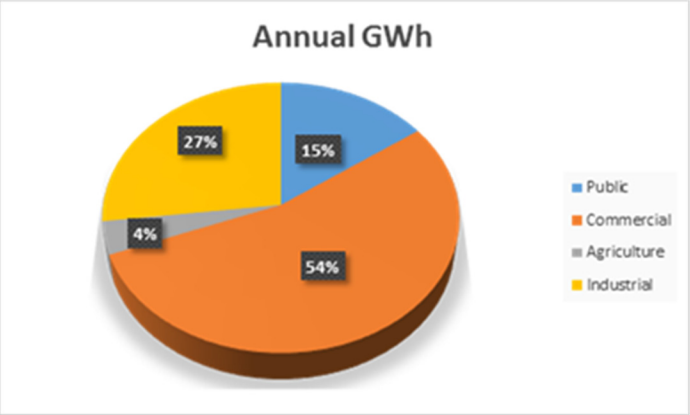
Table 45. Public Sector Segments and Sub-segments

Local Gov't	State	Federal	Education
• Cities • Counties • Special Districts • Solid Waste Facilities • Water / Wastewater Facilities • Hospitals • Correctional Facilities	• State Buildings • State Park Facilities • Hospitals • Correctional Facilities	• Federal Buildings • US Postal Service • Hospitals • Ports • Military Bases	• K-12 Schools (Schools, Admin Buildings) • Higher Education (e.g., UC/CSU)

b) Customer Types

Although the Public sector collectively comprises a small absolute number of service accounts, it represents 15 percent of SCE's total nonresidential energy usage (see Figure 24).

Figure 24. SCE Annual Usage by Nonresidential Sector



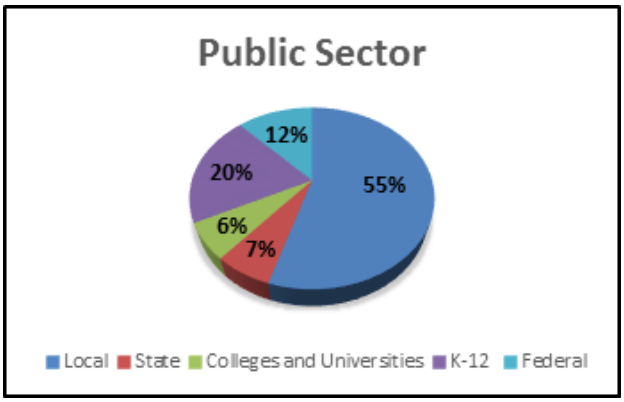
As shown in Figure 25, the Local Government (LG) segment is responsible for the majority (55 percent) of energy consumption within the Public sector. Within the LG segment, municipalities (i.e., cities and counties) use the largest percentage of energy, more than 50 percent, with water agencies comprising the remaining half of usage. Collectively, the local government segment represents more than 4.4 billion kWh of electricity usage.

The State Government segment represents 7 percent of the total Public sector energy usage. The State's facilities are comprised of a mixture of building types, with a significant portion of the energy consumption occurring in a relatively small percentage of facilities. This unique factor allows the vast majority of energy usage to be addressed by a focus on specific and targeted accounts, but requires the ability to offer a variety of DSM support and solutions to meet unique needs. Ongoing changes in Public sector DSM offerings will be required as new customers of varying sizes and sophistication materialize.

K–12 schools and colleges and universities represent 26 percent of the Public sector's total energy usage, with K–12 schools alone consuming 1.8 billion kWh.

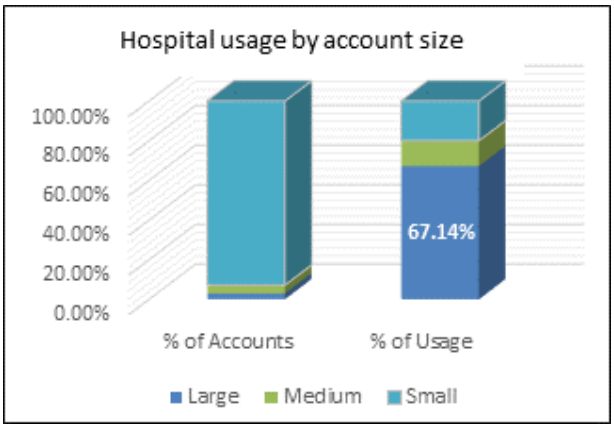
Federal energy usage is nearly one billion kWh and represents 12 percent of the energy consumption in the Public sector. Federal departments' energy usage and bills may be managed by regional offices located outside of SCE's service territory or in other states.

Figure 25. Public Sector Usage by Segments[260]



For many Public sector customers, energy usage is in very large facilities, which tend to be master-metered. This allows a concentrated effort toward providing DSM applications to these facilities, but presents challenges for managing and monitoring site or building specifics. An example of the disproportionate energy use by larger accounts is shown in Figure 26. In the public hospital sub-segments for SCE (from state, local, federal, and education), three percent of accounts comprise of 67.14 percent of usage).

Figure 26. Hospital Usage by Service Account



2. Public Sector EE Potential

Because the Public sector has traditionally been considered part of the Commercial sector, a comprehensive study has not been conducted for the California market that

[260] The usage figures of State public institutions, such as the California Community Colleges, California State University, and University of California, are considered separate from the State's energy usage figures. Includes public healthcare facilities only. Includes all K-12 (both public and private)

specifically addresses Public sector energy savings or market saturation. As such, market potential by territory has not been developed. New studies may help refine savings potential estimates for the Public sector. In order to begin developing the market potential for the sector, SCE proposes the calculation methodology discussed in Appendix I to estimate the EE savings potential in the Public sector: Using this methodology, SCE has potential energy savings of approximately 85 GWh and potential demand savings of approximately 12 MW for the Public sector in 2018. Energy savings are estimated to decrease to approximately 70 GWh by 2024, while demand savings are estimated to increase to approximately 17 MW by 2024. Table 46 shows this potential broken down by end use.

Table 46. Public Sector Potential by End Use

End Use	GWh
Appliance/Plug	2%
Building Envelope	2%
Commercial Refrigeration	2%
Food Service	1%
HVAC	10%
Lighting	53%
Service	5%
Service Hot Water	0%
Whole Building	25%

C. Public Sector Drivers

This section describes the drivers in the Public sector that shape the landscape of EE beyond the sector's market characteristics and potential. SCE describes various EE program trends and results of EM&V studies in this section.

1. Regulatory and Legislative Drivers

The policy drivers for the Public sector are largely the same as general portfolio drivers described in the Portfolio Summary chapter (Section III.B.1). Some of these policy drivers have specific impacts on the Public sector, which are described below.

The Strategic Plan identifies five goals focused on the LG segment of the Public sector. These goals focus on leveraging the LGs' authority and leadership roles to:

- Lead adoption of higher EE standards or "reach codes";
- Lead energy code compliance enforcement;
- Lead by example in their facilities;
- Lead their communities with innovative EE programs; and
- Enable LG EE expertise to become widespread.

Many of the goals and strategies for the LGs can also apply more broadly to all public entities, which can leverage their jurisdictional authority to lead and facilitate the implementation of EE plans in order to meet state goals as outlined in state legislation and executive orders.

AB 32 directs the California Air Resources Board (CARB) to develop and implement GHG emission reduction standards for the state to reduce GHG emission by 15 percent by 2020. To comply with these standards, LGs develop Climate Action Plans that outlines the specific activities that will be undertaken. Climate Action Plans are comprised of many EE program offerings and can leverage many strategies proposed in this business plan to better serve their communities. Recently, AB 32 was expanded by the passage of SB 32, approved in September 2016, which extends the carbon emission reduction goal to 40 percent below 1990 level by 2030. CARB remains the agency responsible for implementation of the program, and local governments remain responsible for expanding the GHG emission reduction plans in their Climate Action Plans. The state's carbon reduction goals have driven California, the Public sector in particular, to adopt EE. Additionally, many Public sector customers have adopted Climate Action Plans that outline how they should move toward reducing carbon emissions. Measures included in Climate Action Plans, such as reach codes, point-of-sale codes, and streamlined permitting for ZNE, are driving the market toward greater EE all across the jurisdictional territory.

A provision in AB 802 allows PAs to receive credit for energy savings from, and provide incentives and support for, EE projects that help Public sector entities meet code requirements ("get up to code"). This helps address the significant issues of deferred maintenance and building upgrade backlogs in the Public sector.

Proposition 39 (Prop 39), the California Clean Energy Jobs Act, gives public schools in California funds to complete clean energy projects, subject to cost-effectiveness requirements. SCE works with these public schools by providing technical expertise and information about its program offerings that can enhance the types and scale of projects a school is able to complete (that is, by providing information about types of projects to include and/or coupling Prop 39 funds with IOU incentive dollars).

Executive Order B-18-12 enacted several requirements for state buildings aimed to reduce the costs and environmental impacts of operating a state building. Specifically, the Order requires the following:

- Directs state agencies to reduce grid-based energy purchases for state-owned buildings by at least 20 percent by 2018;
- Requires that state-owned buildings participate in DR programs, use clean on-site power generation (>10,000 sq. ft.), and incorporate building commissioning processes;
- Requires state agencies to identify and pursue available financial and project delivery mechanisms to achieve these goals; and
- Requires state buildings to be ZNE by 2025.

2. <u>Public Sector Market Trends</u>

Section III.B.2 of the Portfolio Summary chapter describes the market trends applicable to all of the sectors in the EE portfolio. This section addresses market trends specific to the Public sector.

While increased access to financing is a general trend for the EE marketplace, there are some aspects that specifically affect the Public sector. The banking industry has begun

to make new financing mechanisms available that make it more feasible for public agencies to obtain financing for energy projects.[261] In addition, the U.S. Department of Energy (DOE) provides a number of financing and grant opportunities to assist energy projects on a federal level; the CEC provides one-percent loans for public agencies that provide additional funding for EE projects; and the utilities deliver programs for both on-bill and third-party financing.

The declining costs of DG, such as solar, is a key market trend affecting EE. The Public sector is uniquely affected by this trend because Public sector buildings often have high public visibility and many Public sector customers have constituents with a high demand for their public entities to use green energy sources.

Public agencies in California realize the importance of reducing their energy usage as the first step towards greater resilience, so they are focusing upon increasing the resilience of their infrastructure by evaluating different opportunities for energy usage reduction, including self-generation, storage, and micro-grids.[262] Utilities, as well as state, federal, and local agencies, play a vital role in helping make the infrastructure not only safe and reliable, but flexible enough to meet times of varying needs.

3. Public Sector Barriers and Challenges

There are three key barriers to EE adoption in the Public sector that have influenced SCE's EE portfolio proposals. These three barriers are:

- Financing and procurement hurdles that challenge adoption;
- Lack of technical resources to identify, develop, and implement projects; and
- Inadequate data about building level performance, making identification of potential energy savings difficult.

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[261] The Energy Network Energy Project Lease Financing is one option for accessing private lender project financing. More information *available at* http://action.theenergynetwork.com/home/showdocument?id=970.

[262] For example, the US Department of the Navy approved MOU-16-002 with the CEC to collaborate on energy-related issues for the goal of energy assurance and resiliency, *available at* http://www.energy.ca.gov/business_meetings/2016_packets/2016-09-14/Item_01a.pdf

a) Financing and Procurement Barriers

Financing and procurement barriers challenge adoption of EE measures and create longer-than-usual project timelines. While the same challenges exist for customers across the portfolio, the Public sector is unique in that projects must go through a lengthy public approval process. Additionally, several of the traditional commercial means of financing EE projects are either unavailable to this sector or require separate, lengthy approval processes. Financing and procurement market barriers manifest in the Public sector in the following ways:

- The Public sector has limited capital budgets to spend on EE projects.[263] EE projects compete for capital budgets with other necessary and higher-visibility projects. While the benefits of EE may be clear, Public sector entities must satisfy constituent and customer needs first. Public sector customers are focused on public safety and regulatory compliance, often giving EE projects lower priority;
- Procurement and vendor selection challenges are common in the Public sector.[264] Except in certain circumstances, Public sector customers must put all contracted work out for public bids, creating a longer lead time. Additionally, selected vendors must often meet more stringent hiring and pay requirements than those presented by Commercial sector customers;

[263] For example, 62 percent of California school districts underspend each year on facility maintenance and operations. Jeffrey M. Vincent & Liz S. Jain, "Going it Alone: Can California's K-12 School Districts Adequately and Equitably Fund School Facilities?," p. 12, (November 2015) (working paper), *available at* http://citiesandschools.berkeley.edu/uploads/Vincent__Jain_2015_Going_it_Alone_final.pdf.

[264] LG procurement challenges are outlined in the "Local Government Energy Efficiency Resources Guidebook 4: Project Procurement," The Energy Coalition (September 2013), *available at* http://publicagencies.theenergynetwork.com/home/showdocument?id=38.

- Public sector customers, in general, are risk-averse and hesitant to try unproven or unprovable products or services.[265] With limited capital resources, Public sector customers operate equipment until it fails. Proactive upgrades of equipment are rare, resulting in fewer opportunities for EE upgrades;[266]
- Public sector customers' internal decision-making processes can be lengthy and burdensome, resulting in increased costs and project delays;
- Some Public sector customers are limited in the amount of financing and/or funding they can receive because of lender requirements for payback periods. As a result, the scope of some projects must be reduced to meet those requirements;
- Public sector entities may not allocate funding that will support both the operational budget of a project and the necessary capital needed to fully implement the project. They may see these costs as two separate budget line items, so in some cases first cost becomes their only criterion for evaluation;
- The IOUs plan programs on a calendar-year basis, while Public sector customers plan for the fiscal year. This means that they may not receive funding for projects until the start of their fiscal year — six

[265] Toward an Entrepreneurial Public Sector: Using Social Exchange Theory to Predict Public Employee Risk Perceptions, Anna Fountain Clark, 45 PUBLIC PERSONNEL MANAGEMENT 335, 335 (2016) "public servants tend to be generally risk averse in their behaviors and personal preferences", *available at* http://www.scilit.net/article/10.1177/0091026016669169.

[266] For example, a Cal State University Facility Condition Assessment analysis found that nearly 90% of equipment is beyond its expected useful life. Analysis provided from Facilities Management Division at CSU Chancellor's Office, attached as Appendix S.

months into the calendar year. This can be problematic, especially if program changes are made on a calendar basis;

- All governmental entities must adhere to legal requirements for hiring project implementers (building and electrical contractors, architects, etc).[267] These requirements are often inflexible and can make meeting EE program project timelines and requirements difficult; and
- Some Public sector customers are not allowed to make multi-year debt commitments, such as loans through the On-Bill Financing Program.[268] In addition, all governmental entities must adhere to a debt ceiling, which limits their ability to take advantage of certain financing sources and does not allow them to borrow additional capital.

In addition to the financing and procurement barriers discussed above, several additional financing and procurement challenges face the Public sector and affect different segments within the sector:

- State government customers face a financial challenge to cost-effectively install EE measures. Because buildings tend to be small in size, it does not benefit from the advantages of economies of scale. Many of the buildings are smaller than 20,000 square feet, such as California Highway Patrol (CHP) stations, Department of Motor Vehicle (DMV) offices, and CALTRANS maintenance facilities;
- Water and wastewater agencies face challenges to develop EE projects because on-site generation facilities unfavorably affect the amount of

[267] *See* generally State Contracting Manual, Chapter 2: The Basic Contracting Process, *available at* www.dgs.ca.gov/ols/Resources/StateContractManual.aspx

[268] For example, the Counties of Los Angeles, Riverside, and San Bernardino are unable to access certain financing mechanisms such as On-Bill Financing.

EE savings that can be incentivized.[269] Water and wastewater agencies are also seeing decreasing water sales and associated revenue, which can hamper the amount of capital available for EE;[270] and

- K–12 and community college customers now have access to Prop 39 funding, a major source of EE funding. However, the approval process can be lengthy and complex.

b) Technical Resource Barriers

The Public sector lacks technical resources to identify, develop, and implement projects. While technical resource challenges can be found across the EE portfolio, the Public sector is unique in that the procurement of qualified technical resources can be significantly more costly and time-consuming than for Commercial customers. Technical barriers manifest in the Public sector in the following ways:

- While some larger Public sector customers have in-house expertise, it is often concentrated in a central location and specific site knowledge may be limited.[271] Meanwhile, smaller or more financially challenged Public sector customers such as cities or school districts often lack in-house EE expertise entirely;[272]

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[269] An example of the segments push for on-site generation and self-sufficiency can be seen in the "Energy and Water Resources ACWA Policy Principles," Association of California Water Agencies, (Oct. 2015), *available at* http://www.acwa.com/sites/default/files/post/energy/2015/11/acwa-energy-and-water-resources-policy-principles.pdf.

[270] National Water Rates Summit, Declining Water Sales and Utility Revenues: A Framework for Understanding and Adapting, (Aug. 2012), *available at* http://www.allianceforwaterefficiency.org/uploadedFiles/Resource_Center/Library/rates/Summit-Summary-and-Declining-Water-Sales-and-Utility-Revenues-2012-12-16.pdf.

[271] For example, the UC and CSU systems have dedicated energy management teams dedicated to reducing energy usage and meeting their GHG reduction goals.

[272] For example, many of the Local Government Partners have an assigned energy staff member, but that person is often working part time on energy-related issues and is not a dedicated energy manager.

- The Public Contract Code (PCC) requires Public sector entities to meet certain requirements in order to procure goods and services.[273] These requirements include specific timelines and protocols for every project and customers must have in depth knowledge of these requirements and follow them strictly. For instance, the PCC specifies advertising requirements for soliciting contractors and timeline expectations in order to ensure that legitimate contractors submit bids; and
- Other factors, such as prevailing wage requirements, Disadvantaged Business Enterprise (DBE), Veteran Business Enterprise (VBE), and Women & Minorities Business Enterprise (WMBE) goals and statutes may create additional barriers for Public sector customers.

In addition to the technical barriers addressed above, there are several additional technical challenges facing the Public sector that affect different segments within the sector. The higher education segment possesses some of the most qualified technical specialists in the field, but the sector often procures or pilots innovative EE technologies that are difficult for even the most knowledgeable specialists. Higher education customers also face the challenges of maintaining high-end laboratories with specialized energy usage needs and new technologies' potentially interfering with their work. K–12 customers are often hesitant to install new EE technologies because of the lack of end-use training and the potential for vandalism.[274]

c) Data Challenges and Barriers

Inadequate data on building level performance makes identification of EE potential difficult. While there are data challenges across the portfolio, data is especially challenging in the Public sector because many Public sector facilities are master-metered.

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[273] *See generally* California Public Contract Code - PCC, *available at* http://codes.findlaw.com/ca/public-contract-code/.

[274] FBI crime statistics show that there are roughly 65,000 incidents of crime against property each year including vandalism, theft, and burglary (2000-2004). FBI, National Incident-Based Reporting System "Crime in Schools and Colleges," *available at* https://ucr.fbi.gov/nibrs/crime-in-schools-and-colleges.

Master-metered facilities do not have insight into building level usage. For example, in SCE's territory, over 75 percent of high schools are master-metered, and for LGs, while only four percent of municipal *accounts* are master-metered, over 58 percent of their total *usage* is master-metered. Additionally, programmatic, EM&V, and historical savings and usage data is not widely available because this is the first time the Public sector has been considered as a separate sector. Data barriers manifest in the Public sector in the following ways:

- Building controls and enterprise-wide energy management systems may address some data needs. However, many Public sector customers lack access to adequate building controls.[275] Sites that are master-metered (such as campus facilities) often are not sub-metered, which inhibits an enterprise management system. At smaller facilities, such as DMV offices or CHP stations, the scale prevents the procurement of cost-effective building controls; and
- The Public sector has historically been part of the Commercial sector. As a result, data about the sector's EE potential and about key areas within the sector need to be developed.

In addition to the data barriers addressed above, several additional data challenges facing the Public sector affect different segments within the sector. For example, LG customers require community data for climate action plans and GHG inventories, but data aggregation and anonymization rules prevent access to detailed site level data.[276]

d) Additional Public Sector Challenges

The challenges with the TRC methodology and reductions in avoided cost are discussed in Section III.H of the Portfolio Summary chapter. Although the decrease in avoided cost is a portfolio-wide problem, it is more prominent in the Public sector because

[275] For example, EMS is now a recommendation in the "California Community Colleges Energy Project Guidance" document of the California Community Colleges Chancellor's Office, p. 8, (May 2013), *available at:* http://web.peralta.edu/pbi/files/2010/11/CCC_Prop-39_Guidance-May-29th.pdf.

[276] D.14-05-016, pp.32-33.

energy savings are not easily realized in that sector and because of the sector's additional cost burdens of outreach and strategic planning.

Within SCE's existing portfolio, much of what is easy to do and cost-effective in the Public sector has already been done.[277] This has reduced savings values of the current EE measures and reduced the number of offerings available to the Public sector, which has placed pressure on the remaining EE portfolio. The value of EE needs to be reassessed because of the decreasing TRC, increasing ISP, and higher Title 24 and Title 20 standards.

A lack of adequate "spillover" attribution hinders Public sector cost-effectiveness. "Spillover" is the influence of an EE project/incentive to encourage other future EE projects by other customers. Spillover is currently calculated the same in Public sector EE projects and Commercial sector EE projects. However, spillover is likely to be greater in the Public sector because of the influence governmental entities have on the community. A revised spillover methodology for public sector customers could improve the accuracy of savings associated with the Public sector's strategic plan activities. To accurately give credit to PAs and their associated partners for energy savings, SCE recommends that the CPUC give special consideration to quantifying Public sector spillover.

Most Public sector customers are also under mandates to achieve EE, GHG reduction, or other sustainability goals. Although unfunded, the presence of these mandates is calculated into the Net-to-Gross ratio as a major influence on retrofit decisions that cannot be attributed to PA programs. This lowers the amount of savings that PAs can claim from projects.[278] This type of reasoning, while perhaps more appropriate for commercial customers, counters the spirit of private / public partnerships, which is to encourage the leveraging of private funds for public improvements. If ex-post impact evaluations of Public sector programs do not

[277] For example, T-12s fluorescent lightbulbs and compact fluorescent lightbulbs (CFLs) have reached market maturity and are no longer incentivized.

[278] Itron, Inc., 2014 Custom Impact Evaluation Industrial, Agricultural, and Large Commercial, p. 4-10,(Mar. 2016) (draft report) (stating that corporate standard practice contributes to a "lower level of program influence."), *available at* http://www.energydataweb.com/cpucFiles/pdaDocs/1475/IALC%202014%20Draft%20Report%20March%202016.pdf.

account for the prevalence of unfunded mandates and the critical role that utility customer funds play in realizing much-needed public projects, Public sector programs may not be viable under traditional metrics of cost-effectiveness.

4. Lessons Learned from Past Cycles and EM&V Studies

The Public sector is newly defined and there have been no evaluation studies or recommendations for this sector. Within the sector, SCE has offered "partnership" programs to LGs and statewide institutions since 2003. Currently, Local Government Partnerships (LGPs) promote three categories of activities:

- Municipal retrofits of government buildings;
- Strategic Plan support activities; and
- Core program and Codes and Standards coordination.

Recent evaluations across two different studies have found that participating LGs are heterogeneous and not easily categorized.[279] While most recommendations from past process evaluations are specific to the LG segment, four types of recommendations speak to persistent market barriers that may well also apply to the entire sector:

- Recommendations to help LGs find supplemental funding sources;
- Recommendations to help LGs overcome challenges due to not having enough internal staff;
- Recommendations to help LGs use or share their building usage data; and
- Recommendations for more technical support to LGs.

Most recently, a 2016 process evaluation (in its final phase at the time of this writing) provided more actionable details about the specific types of technical assistance needed:

[279] Evergreen Economics & Navigant Consulting, Program Assessment Study: Local Government Partnership Programs –Final Report, (July 2013), *available a*t http://calmac.org/publications/LGP_Program_Assessment_Report_-_final.pdf; Research Into Action, Inc., and Targeted Process Evaluation of the Local Government Partnership Programs (Oct. 2016) (draft report), *available at* http://www.energydataweb.com/cpucFiles/pdaDocs/1669/LGP%20TPE_Draft%20Report_10.25.16.pdf.

calculation of energy savings, implementation of energy management systems, and job order contracting of retrofit projects.[280]

The Institutional Partnerships, such as the California Community Colleges Partnership or the State of California Partnership, have a different set of challenges. While there have been no recent evaluations of these partnerships, past evaluations (by PA Consulting[281] and Navigant[282]) have found that most barriers to EE were due to the administrative structure of these entities. Entities with distributed leadership had difficulties planning and executing projects, while entities with a centralized leadership, such as the UC System, were highlighted for their superior achievements in EE.

SCE also reviewed the two studies that were conducted regarding Southern California Regional Energy Network (SoCalREN): a value and effectiveness study[283] and a program impact assessment.[284] The value and effectiveness study was focused primarily on REN effectiveness and did not apply across PAs, but there were some takeaways that could apply to the sector as a whole. Public agencies indicated that the technical services that were provided reduced the time to implement the project. Also, the expertise provided exceeds that of the local

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[280] Research Into Action, Inc., Targeted Process Evaluation of the Local Government Partnership Program, p. VI, (Oct. 2016) (draft report) *available at* http://www.energydataweb.com/cpucFiles/pdaDocs/1669/LGP%20TPE_Draft%20Report_10.25.16.pdf.

[281] PA Consulting Group, Southern California Edison Summary Report: Process Evaluation of the 2006–2008 Local Government and Institutional Partnership Programs—Final Report, (Feb. 2009), *available at* http://calmac.org/ publications/06-08_SCE_Local_Govt_Inst_Partnerships_Process_Evaluation_Report.pdf.

[282] Navigant Consulting, Program Assessments Study: Statewide Institutional IOU Energy Efficiency Partnership Programs, (Oct. 2012), *available at* http://www.energydataweb.com/cpucFiles/pdaDocs/908/Statewide_Institutional_IOU_Energy_Efficiency_Partnership_Assessment%20Final%20Draft.pdf.

[283] Opinion Dynamics, PY 2013–2014 Regional Energy Networks, Value and Effectiveness Study, Final Report, Opinion Dynamics Corporation (Jan. 2016), *available at* http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M157/K542/157542168.PDF.

[284] Itron, Inc. et al, 2013-14 Regional Energy Networks and Community Choice Aggregator Programs Impact Assessment Final Report, (Jan. 2016), *available at* http://www.calmac.org/publications/REN_CCA_Impact_Assessment_Final_Report_NoAppendicesES.pdf.

agency. Learnings from this study indicate that public agencies often lack technical knowledge and find value in technical assistance. The program impact assessment was focused on the REN's Single-Family and Multifamily Programs specifically and did not have any key takeaways for the Public sector as a whole.

D. SCE's Approach to Achieving Sector Goals

SCE has developed its Public sector EE portfolio to accommodate the drivers, recognize the market trends, and address the challenges described above in order to meet the sector goals. This section describes the Public sector portfolio approach.

1. Sector Strategy Overview

SCE will deploy programs that provide financial and procurement solutions, relevant energy usage information, and customer education that will enable Public sector customers to participate in EE and DSM programs. A diverse offering of programs and services will target the variety of needs of each segment, sub-segment, and individual customer. This will help Public sector customers contribute to the state goals of reducing GHG emissions, help SCE increase grid reliability, reduce the need to build new energy infrastructure, and help transform the market.

2. Existing Products and Services

Though these entities were not previously defined as a separate sector, SCE has worked with Public sector customers on EE and DR for many years and has developed a robust portfolio of products and services that address the sector's needs.

Historically, the primary Public sector programs have been LG and institutional EE partnerships. SCE currently has 21 LGPs, focused on driving entities to pursue EE at their facilities, promote EE to their constituents, and develop policies, procedures, and codes that further the Strategic Plan. SCE also is a partner in four Institutional Partnerships that span the whole state and is dedicated to driving greater EE in higher education and state-owned buildings. The partnerships provide technical assistance to partners for identifying, developing, and verifying EE projects.

SCE's Partnership Program Portfolio underwent a concerted effort to optimize the 2017 budget and resources in order to achieve a more cost-effective portfolio.[285] One area of focus is through better leveraging of internal, lower-cost resources for technical support (e.g., energy audits, project identification, and application support). In addition, SCE is also pursuing opportunities to move to a regional approach for LGPs. A regional approach will provide LGPs more opportunities to share best practice, leverage resources across the region, and facilitate targeted regional outreach. SCE has also worked with Energy Division Staff to streamline the Strategic Plan process and contracting of Strategic Plan technical assistance, with the goal of cost-effectively increasing short-term and long-term EE savings while continuing to provide value to partners. Lastly, SCE is seeking to align the 2017 budget more closely with the energy savings potential and resource needs of our partners.

Additionally, the Statewide Energy Efficiency Collaborative (SEEC) is a joint partnership of the four statewide IOUs and three non-profits — ICLEI-Local Governments for Sustainability, Institute for Local Governments (ILG), and the Local Government Commission (LGC) — with the goal of promoting sustainability and sharing EE best practices with LGs throughout the state.

a) Public Sector Facility EE

This section highlights the programs that are directed toward increasing EE at Public sector facilities. Deemed and customized rebates are designed to help Public sector customers acquire and install EE measures. Deemed rebates are pre-set incentives for well-established measures that have had their savings verified through workpapers. Customized rebates, on the other hand, are available for projects that are novel and/or complex, where energy savings must be calculated, measured, and verified before incentives can be paid.

One of the major challenges for Public sector customers is the ability to finance EE measures. LG and institutional partners receive enhanced incentives through the

[285] *See* SCE Advice Letter 3465-E.

partnership program. SCE also provides On-Bill Financing (OBF), which makes loans available to customers to finance EE projects that are repaid monthly via electricity bills.

Several third party-implemented programs work with the Public sector to promote EE. One of the most popular is Direct Install, a program that installs EE measures in small commercial and LG facilities (with usage < 200 kW). Another program, the Schools EE Program (SEEP), provides EE services to private and public schools, including preschools, K-12 schools, colleges, universities and trade and technical schools in SCE's service territory.

SCE also offers a third party-implemented program designed for water customers called the Water Infrastructure Systems Efficiency Program (WISE). WISE is a DSM program designed to provide EE solutions to water production, distribution, and treatment systems. The program serves water agencies, special districts, and local governments with a focus on water treatment, wastewater treatment, and pumping facilities and systems.

SCE's Water-Energy Nexus work focuses on saving water as a means of saving energy. Water-Energy Nexus offerings include providing water utilities and cities expertise on pressure management and active leakage control. A Continuous Energy Improvement (CEI) program targeting the water and wastewater utilities is offered to drive energy savings.

Title 24 training for Public sector customers has been beneficial in encouraging and educating the sector about EE technologies and requirements. Additionally, Title 24 Code Compliance training (subprogram in Codes and Standards) targets building inspectors and plan checkers. More information about Code and Standards and Workforce, Education and Training is discussed later in this chapter and in the Cross-Cutting chapter.

The Pump Test Services Program tests and services agricultural and water pumps, with a focus on interaction with the associated pumping systems to drive energy savings.

Table 47 identifies which of the three primary Public sector barriers these offerings help overcome in order to drive increased EE savings.

Table 47. SCE Current Public Sector Facility EE Programs and Barriers to Be Overcome

SCE Offerings	Public Sector Components	Barrier(s) to Overcome
Partnerships	• Local Government Partnerships • Institutional Partnerships	Financial / Procurement Technical
Direct Install	• Opportunity for cost-sharing	
Third Party	• Coordination with applicable third-party programs (e.g., the WISE Program)	
Water-Energy Nexus	• Automated Meter Infrastructure (AMI) for water metering • Joint program offerings with water agencies, where applicable	
Deemed Rebates	• Enhanced rebates	Financial / Procurement
Customized Retrofit Rebates	• Enhanced rebates	
On-Bill Financing	• Special considerations	
Technical Assistance	• Internal engineering resources • Building analytics • Water systems assessment	Technical
WE&T and C&S	• DSM Training • Code Compliance / Enforcement Training • Title 24 Training	
Pump Testing	• Pump Test Services	

b) Core Program Coordination

SCE also works with the Public sector in community outreach for a variety of EE activities:

- Through its LGPs, SCE presents co-branded marketing with the LGs to promote EE in general and specific EE programs The LGPs also promote EE at community events throughout the territory, make presentations on the benefits of EE to city councils, and meet with local elected officials to explain and promote EE benefits, technologies, and programs;
- Higher education partnerships have promoted IDSM at events on campuses, such as student orientation ("move-in day"); and

- Traditionally, SCE has worked with water and wastewater agencies both as customers in need of their own DSM support and also as partners in delivering efficiency products and programs to a diverse set of joint customers, ranging from industrial processes to residential customers.

c) Strategic Plan Support

In addition to facility EE and outreach to communities, SCE has been working with the Public sector on policies, codes, and plans to help promote the goals outlined in the Strategic Plan. Over the past seven years, SCE has overseen $29 million in Strategic Plan work that was accomplished through a solicitation to LGs, including:

- Utility management systems;
- Energy Action Plans (EAPs);
- EE chapters of Climate Action Plans;
- Building code trainings; and
- Reach codes that set standards higher than in existing building codes.

Additionally, the SEEC is a joint partnership with the goal of promoting sustainability and sharing EE best practices with LGs throughout the state. This partnership helps LGs with Strategic Plan goals through sharing best practices and the ICLEI ClearPath GHG Inventory Tool.

In addition, LGPs have completed less complex Strategic Plan tasks through their partnership budgets. Lessons learned from the work accomplished to date have helped develop a new Strategic Plan process. SCE has also developed a Best Practices document for LGs to use when interested in pursuing new Strategic Plan tasks. In this new process, SCE has worked with Energy Division staff to develop a framework for innovative Strategic Plan activities to be proposed by local governments.

3. Intervention Strategies

Implementation plans will use the intervention strategies described below to leverage programs for the various segments and sub-segments of the Public sector. While not every strategy will be used in every Public sector program, the following sections provide an overview of the strategies that will be employed in future programs to overcome the market barriers and achieve SCE's 10-year vision for the Public sector.

a) Strategies to Overcome Financing and Procurement Challenges

Table 48 describes the intervention strategies SCE will use to overcome the problem that financing and procurement challenges negatively affect EE adoption in the Public sector.

Table 48. Financing and Procurement Challenge Intervention Strategies

Strategy	Tactics
Midstream Incentives	• Provide "point of sale" incentives through midstream vendors.
Upstream Incentives	• Provide financial incentives to upstream manufacturers or distributors to buy down equipment costs and/or enable equipment to be available when needed
Third-Party Implemented	• Solicitation for innovative third-party offerings
Financing	• Explore the potential of extended OBF payback periods, increasing OBF caps or disbursing OBF for public sector customers before construction begins • Establish best practices and assist in developing revolving EE funds to help provide a sustainable source of funds for EE projects or Energy Positions • Leverage REN financing program offerings including Job Order Contracting
Partnering	• Regionalization for LGPs for greater collaboration / best practice sharing and cost-efficiency • Streamline delivery of LGPs through modified Energy Leader Partnership model and Strategic Plan process • Statewide implementation of Institutional Partnerships • Partnering with key industry stakeholders to develop / deliver novel EE approaches • Develop quick start guide for new Partners
Direct Install / Turnkey	• Provide opportunities through Direct Install / Turnkey Programs
Customer Incentives	• Provide customer incentives for Public sector customers

b) Strategies to Overcome Lack of Technical Resources

Public sector customers are often unable to pursue EE because of a lack of adequate technical knowledge about EE technologies or processes. Table 49 describes the intervention strategies SCE will use to overcome this challenge.

Table 49. Lack of Technical Resources Intervention Strategies

Strategy	Tactics
Technical Assistance	• Utilize in-house SCE field engineering for greater cost-efficiency • Leverage REN technical assistance program offerings • Provide vendor support for complex projects
Partnering	• Same as in Table 48 above
Direct Install / Turnkey	• Same as in Table 48 above
Third-Party Implemented	• Same as in Table 48 above
Strategic Energy Management (SEM)	• Leverage customer data to benchmark facilities and provide a roadmap for EE retrofit opportunities
Integrated Customer Experience	• Simplify the application and data access processes to allow customers with less programmatic knowledge to be able to participate in EE programs
Strategic Plan Support	• Modified Strategic Plan process that uses tiers of strategic plan support and a streamlined application and contracting process
Intelligent Outreach	• Leverage customer data to target core program coordination and outreach to the community
Rural & Disadvantaged Community Outreach	• Leverage customer data to target core program coordination and outreach to rural and disadvantaged communities • Relax certain program parameters that hinder rural and disadvantaged community participation
Small Business Outreach	• Leverage LGPs to market core programs (such as Direct Install) to small businesses in their community
Water-Energy Nexus[286]	• Provide new technologies or processes to help water customers conserve energy • Longer-term: provide incentives for water savings

[286] Water and energy have an intertwined relationship because electricity can be used to move water and water can be used to make electricity. The water-energy nexus means that saving water will also save electricity. Water and wastewater agencies, as well as public entities that provide retail water to their customers, can greatly benefit from access to EE incentives to drive increased water savings. Additionally, SCE may be able to count the energy savings associated with saving water towards its overall EE goals.

c) Strategies to Overcome Lack of Access to Data

Public sector customers are often unable to pursue EE because of a lack of access to usage data. Table 50 describes the intervention strategies SCE will use to overcome this challenge.

Table 50. Data Access Barriers Intervention Strategies

Strategy	Tactics
Customer Data Access	• Green Button "Download My Data" function for access to usage from individual accounts. • Green Button "Connect My Data" function for customer to authorize SCE to send their energy usage and billing data to registered third parties • Used NMEC for baseline and incentive calculations. For more information see section VIII.D.5.a Public Sector Performance-Based Retrofit High Opportunity Program below.
Community Data Access	• Energy Data Request Program (EDRP) to allow Public sector customers to access community usage data. • Participate on Energy Data Access Committee to provide Public sector perspective
Building Energy Benchmarking Data Access	• Leverage customer data and data analytics tools to benchmark facilities and provide a roadmap for EE retrofit opportunities • Allow sub-metering costs to be included in project costs • Identify EMS solutions to help identify potential and manage energy use
Integrated Customer Experience	• Same as in Table 49 above

4. Public Sector Metrics

For the key barriers in the Public sector, SCE has determined an objective for its EE portfolio and metrics to track progress against these objectives. Please see Section III.I for SCE's portfolio metrics and approach to metrics in general. Table 51 identifies these objectives and metrics and the intervention strategies SCE plans to use. Most of the Public Sector metrics will be tracked quarterly and will be based on program tracking data. The one exception is the "Number of customers with established revolving EE fund policy or program" metric, which will be sourced by customer surveys and tracked annually.

For financing and procurement barriers, the number of customers in each segment participating in EE financing programs is an appropriate metric because it shows how many

customers have been able to overcome financing and procurement challenges to pursue an EE project. In addition, helping customers establish self-funding mechanisms such as a revolving EE funds furthers their ability to overcome these challenges and become self-sustaining.

For lack of technical resource barriers, energy savings by segment is an appropriate metric because it shows the magnitude with which EE savings were able to be identified and followed through to completion.

For data access barriers, the number of projects that utilize SCE meter-based savings programs demonstrates the successful penetration into areas of the sector which have stranded savings and aged equipment.

Table 51. Public Sector Objectives and Metrics

Sector Barriers / Challenges	SCE Objective	Intervention Strategies	Metric
Financing and procurement barriers	Simple, no-hassle, low-cost program transaction that encourages greater customer investment in EE	• Financing • Partnering • Core Program • Midstream • Upstream • Direct Install/Turn-Key • Third Party • Customer Incentives	Number of customers in each segment participating in EE finance programs Number of customers with established revolving EE fund policies & programs
Technical resource barriers	Permanently modify practices to have organizations naturally consider and adopt EE solutions.	• Technical Assistance • Partnering • Direct Install/Turn-Key • Third Party • Strategic Energy Management • Strategic Plan Support • Integrated Customer Experience • Intelligent Outreach • Rural and Disadvantage Community Outreach • Small Business Outreach	Number of customer participating in EE programs by segment Claimable first year savings per customer
Data access barriers	Increased building level data to provide greater EE adoption levels across all public segments.	• Customer Data Access • Community Data Access • Integrated Customer Experience	Number of projects utilizing whole building and/or NMEC methodologies

5. Pilots

SCE plans to leverage three pilots to support administration and foster continuous improvement of Public sector strategies. These pilots are discussed in more detail below.

a) Public Sector Performance-Based Retrofit High Opportunity Program

SCE's proposed Public Sector Performance-Based Retrofit High Opportunity Program is designed to leverage smart meter investments and bring the benefits of NMEC to Public sector buildings.[287] The program will support the climate objectives outlined by the Legislature and the Governor's Office in bills such as AB 32, SB 350, and AB 802.

AB 802 offers new opportunities in California to capture energy savings data, using NMEC for measuring and tracking the savings, primarily at a whole-building level, outside of traditional deemed and calculated energy savings offerings. These data can then be used to calculate appropriate incentives for additional EE work. The Public Sector Performance-Based Retrofit Program is designed to leverage the ability of NMEC to measure energy savings within Public sector buildings classified as hard-to-reach and/or having unique characteristics. The program seeks to help address market barriers unique to the Public sector and encourage persistent energy savings through ongoing feedback and measured performance. SCE will target buildings that are susceptible to and/or have delayed improvements and indefinitely repaired equipment. The program also supports targeted customers' economic goals and Climate Action Plans (CAPs) by allowing participants to track savings to monitor the performance of their long-term EE investments.

Performance-based M&V of savings through NMEC will encourage greater energy savings, while incentivizing only the savings actually achieved. As energy performance is monitored and provided to contractors and customers, it will empower their decision-making and enable them to take corrective action.

[287] SCE Advice Letter 3460-E.

b) Proposition 39 Zero Net Energy (ZNE) Pilot Program

This pilot will assist schools and community colleges in retrofitting existing facilities to ZNE by leveraging Prop 39 funding. The goal of this activity will be to establish a "proof of concept" that ZNE retrofits of schools are feasible across California. The IOUs are targeting approximately 13 to 18 projects in 13 to 18 school districts or community colleges with this effort.[288]

To serve the schools community more broadly, the IOUs will disseminate learnings, processes and materials about ZNE to stakeholders in the education segment. These efforts will involve training classes and webinars, publications, design guides, and recognition events. The IOUs will use lessons learned from the pilot to explore the feasibility of a full-scale program. The pilot efforts are intended to address ZNE needs in schools on a comprehensive and sustainable basis though the duration of Prop 39 and beyond. The scope of the pilot aligns with Prop 39 by encompassing both K–12 public institutions and community colleges.

c) K-12 Zero Energy Building Accelerator Program

The K–12 Zero Energy Building Accelerator Program is a DOE program that is designed to drive schools toward construction of ZNE buildings and to promote market adoption of ZNE facilities. This program, run by the National Renewable Energy Laboratory, is part of DOE's Better Buildings Initiative. As part of this program, SCE will partner with one school district, and relevant school facility and industry stakeholders, to develop a roadmap for the district to cost-effectively achieve ZNE. This roadmap will identify best practices, resources, technologies, and solutions to overcome potential barriers to ZNE adoption. The goal of the roadmap is to provide a foundation upon which the school district can plan for future capital projects and to provide a framework for adoption by other school districts.

[288] SCE Advice Letter 3176-E.

E. Public Sector Budget

Table 52 shows SCE's planned budget for the Public sector for 2018-2025. More details about SCE's budgeting process are described in the Portfolio Summary chapter (Section III.F).

Table 52. SCE's Residential Sector Proposed Budget for 2018-2025

Program Year	Administration ($000)	Marketing ($000)	Direct Implementation ($000)	Incentives ($000)	Total Sector Budget ($000)
2015[289]	$3,264	$445	$8,085	$8,460	$20,254
2016[290]	$1,895	$1,299	$11,362	$7,760	$22,316
2017[291]	$2,133	$336	$9,999	$11,345	$23,813
2018	$1,886	$297	$8,840	$8,585	$19,608
2019	$1,943	$306	$9,105	$8,843	$20,197
2020	$1,982	$312	$9,287	$9,019	$20,601
2021	$1,942	$306	$9,102	$8,839	$20,189
2022	$2,000	$315	$9,375	$9,104	$20,794
2023	$2,060	$325	$9,656	$9,377	$21,418
2024	$2,122	$334	$9,946	$9,659	$22,061
2025	$2,186	$344	$10,244	$9,948	$22,722

F. Public Sector Coordination and Integration

1. Key Partners

The Public sector contains many partners working together to further the State's GHG emissions and EE goals. The primary partners are Public sector customers: local, state, and federal government entities, higher education customers, and K-12 schools. Table 53 outlines the key partners of the Public sector.

[289] Actual expenditures.
[290] Actual operating budget.
[291] Proposed budget.

Table 53. Public Sector Key Partners

Key Partner	Partner Details	Relationship
Joint Powers Authority (JPA)	Joint powers authorities (JPAs) and special districts are both considered a form of local governments and are crucial to the success of the public sector. JPAs include Councils of Governments (COGs) or Associations of Governments (AGs) representing local jurisdictions on policies such as transportation and, increasingly, climate and energy policy.	JPAs are both a customer and a key partner in public sector energy efficiency. Several JPAs act as implementing partners in local government partnerships.
Special District	Special districts have a defined area and are tasked with a special purpose, such as vector control districts or regional transportation agencies.	Special Districts are both a customer and a key partner in public sector energy efficiency.
Non-profit Organizations (NPOs)/Non-governmental organizations (NGOs)	Organizations set up for public good that has a primary focus on promoting sustainability and energy efficiency	NGOs/NPOs act as a key partner in public sector energy efficiency. Several NPOs act as implementers for several local government partnerships. Additionally, the Statewide Energy Efficiency Collaborative (SEEC) is a group of IOUs and NGOs that work to promote energy efficiency in the state. SEEC includes all of the state IOUs and ICLEI, ILG, and LGC.
Regulatory Agencies	Governmental agencies tasked with overseeing compliance with regulations.	Regulatory agencies provide the regulatory guidelines and rules for energy efficiency.
Program Administrators/ Regional Energy Networks	Organizations that oversee/manage energy efficiency programs.	A partner in the development, coordination, and implementation of programs. More details on PA coordination can be found in section III.D.1.a.
Intervenors	Agencies or organizations that represent a particular perspective before any CPUC proceedings	Key stakeholders in energy efficiency in the state that help shape the programs and guidelines.
Trade Industry	Companies and trade organizations that provide services to implement energy efficiency in the state.	Trade industry provides necessary technical and implementation services and are key stakeholders in energy efficiency in the state.

Several working groups (with Public sector customers) deal with EE-related issues:

- The Rural Hard-to-Reach Work Group (RHTR) is a joint body of local governments studying issues and possible solutions to challenges associated with rural areas of California.

- The California Technical Forum (CALTF) is a panel of technical experts who help produce unbiased technical information about demand-side management technologies.
- The Energy Data Access Committee is a group of stakeholders working to develop policies around energy data to strike a balance between the benefits of access to data and privacy concerns.

2. <u>Cross-PA Coordination</u>

The Public sector provides opportunities for collaboration and coordination across PAs (IOUs, RENs, and CCAs) and municipalities. LG and Institutional Partnerships have been working across PA territories for several years. This close coordination will continue in the coming years to deliver DSM solutions more efficiently and effectively to Public sector customers.

SCE has several partnerships that span multiple PA territories:

- SCE has a joint LGP with SoCalGas in 17 partnerships: Community Energy Partnership (CEP), Desert Cities, Gateway Cities, Los Angeles County, North Orange County Cities, Orange County Cities, Redlands, Riverside County, San Gabriel Valley, San Bernardino County, San Bernardino Regional, Santa Ana, South Santa Barbara, South Bay, Ventura, West Side, and Western Riverside;
- Two LGPs are jointly administered by SCE, SoCalGas, and PG&E: Kern County and San Joaquin (aka VIEW, Valley Innovative Energy Watch); and
- The SEEC is a group of IOUs and NGOs that work to promote EE in the state. SEEC requires close collaboration of all of the state IOUs and ICLEI, ILG, and LGC.

To support sharing of best practices across IOU territories, SCE facilitates and participates in the annual SEEC Forum[292] and the Central California Local Government Partners annual meeting.[293] Additionally, SCE works with all of the statewide IOUs on Institutional Partnerships (IPs). These programs and their transition to statewide administration are discussed further in the next section.

a) Statewide Program Coordination

Several state institutional partnerships will be managed as a statewide program by a lead PA. The Portfolio Summary chapter (Section III.E) includes a detailed description of the approach for statewide administration. The Public sector programs that are part of the new statewide administration model include:

- The UC / CSU EE Partnership;
- California Community Colleges EE Partnership;
- The State of California EE Partnership (which works with the Department of General Services and other agencies); and
- The California Department of Corrections and Rehabilitation (CDCR) EE Partnership.

SCE is the proposed statewide lead for the UC / CSU Partnership and the California Community Colleges EE Partnership. Table 54 provides additional details for the statewide UC / CSU Partnership proposal and Table 55 provides additional details for the statewide California Community Colleges EE Partnership proposal.

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[292] The SEEC Forum is a venue for partners from across the state to share and discuss best practices and lessons learned to help further energy efficiency in the state. All PAs, partners, and implementers, as well as CPUC ED staff and outside entities are invited to this conference. More information *available at* https://www.lgc.org/2016-seec-forum/.

[293] The Central California Local Government Partners meeting is a venue for California state partnerships located in central California to discuss key partnerships issues with Southern California Edison, Southern California Gas Company, and Pacific Gas & Electric Company.

Table 54. Statewide UC / CSU Partnership Program Details

Program Name: University of California / California State University EE Partnership	
Program Description: The UC / CSU EE Partnership Program is a statewide EE program that establishes a permanent framework for sustainable, long-term, comprehensive energy management at the 10 UC and 23 CSU campuses served by the IOUs. The Universities are large and complex organizations that represent millions of square feet of building space and millions of potential kWh of energy savings and peak demand reduction. The Partnership works to overcome barriers to effective EE improvements at these institutions, both in new construction and in existing facilities. The program is comprised of three elements, which operate on a statewide, integrated basis: Retrofit, Monitoring-Based Commissioning (MBCx), and Training & Education (T&E). The results include both immediate energy savings and setting the foundation for long-term sustainability and best practices	

Program Objectives:
• Deliver energy saving and demand reduction results through integrated partnership activities. These activities will include EE, DR, and DG as applicable to the partner. This partnership also provides a platform to test emerging DSM technology to determine the success or failure of novel concepts.
• Influence energy decisions through the successful implementation of a comprehensive, strategic approach to achieving energy management goals. This approach includes support from multiple PAs in assessing and setting statewide performance goals, developing action plans, and implementing projects to achieve energy savings and verifiable results. Specifically, the Partnership will provide UC and CSU campuses and buildings throughout the state with:
  o Technical assistance in identifying energy efficiency retrofits and AB 802 / Whole Building potential to drive deeper savings
  o Incentives and financial assistance to help overcome barriers to implementation
  o Technical assistance in achieving ZNE goals
• Assist partners with meeting EE regulatory and legislative mandates.
• Facilitate EE best practice sharing, through documentation and other educational and workshop opportunities in order to leverage success across large, complex entities. Leverage partners' internal communication structure to bring IDSM information to internal departments more effectively
	Potential Metrics:
	• Number of campuses participating in EE programs quarterly
	• Quarterly energy savings
	• Quarterly energy savings from whole building projects that receive an incentive

Solicitation Strategy: As the lead PA, SCE will include the UC / CSU Statewide Partnership Program in its Solicitation for	**Transition Timeline:** Pending Commission approval, the transition of program oversight will begin in 2017 with SCE assuming the lead PA role for planning

Innovation. The IOUs will collaborate to review bids prior to contracts being awarded.	purposes. SCE will work with the other PAs in 2017 to develop the program strategy and to plan and conduct the Solicitation for Innovation. Upon successful completion of the RFP, Implementation Plans will be updated. Once an implementer/program design is chosen, the transition will begin for the customer relationship (likely 2018). From a customer perspective, programs will remain the same until such time.

Table 55. CA Community Colleges EE Partnership Statewide Program Details

Program Name: California Community Colleges (CCC) EE Partnership	
Program Description: The CCC System is a public educational institution that includes 113 two-year colleges and is organized into 72 self-governing districts, with 69 off-campus centers and 22 separate district offices. It serves more than 2.4 million students from a wide range of cultural and economic backgrounds, and is the largest system of higher education in the world. The CCC Energy Efficiency Partnership advocates, promotes, and supports EE in the CCC System, its campuses, and its individual districts' administrative offices by leveraging contributions from the four IOUs and the Community College Chancellor's Office. These organizations collaborate to share EE best practices and to implement EE projects for energy savings and peak demand reduction. In addition, the CCC Partnership plays a major role in the ongoing success of Proposition 39 within the CCC System by employing the infrastructure of the Partnership to identify, install, and close out energy projects	
Program Objectives: • Deliver energy saving and demand reduction results through integrated partnership activities. These activities will include EE, DR, and DG as applicable to the partner. This partnership also provides a platform to test emerging DSM technology to determine the success or failure of novel concepts. • Influence energy decisions through the successful implementation of a comprehensive, strategic approach to achieving energy management goals. This approach includes support from multiple PAs in assessing and setting statewide performance goals, developing action plans, and implementing projects to achieve energy savings and verifiable results. Specifically, the Partnership will provide CCC campuses and buildings throughout the state with: o Technical assistance in identifying energy efficiency retrofits and AB 802 / Whole Building potential to drive deeper savings o Incentives and financial assistance to help overcome barriers to implementation o Technical assistance in achieving ZNE goals • Assist partners with meeting EE regulatory and legislative mandates.	**Potential Metrics**: • Number of campuses participating in EE programs quarterly • Quarterly energy savings • Quarterly energy savings from whole building projects that receive an incentive

• Facilitate EE best practice sharing, through documentation and other educational and workshop opportunities in order to leverage success across large, complex entities. Leverage partners' internal communication structure to bring IDSM information to internal departments more effectively	
Solicitation Strategy: As the lead PA, SCE will include the CCC Statewide Partnership Program in its Solicitation for Innovation. The IOUs will collaborate to review bids prior to contracts being awarded.	**Transition Timeline:** Pending Commission approval, the transition of program oversight will begin in 2017 with SCE assuming the lead PA role for planning purposes. SCE will work with the other PAs in 2017 to develop the program strategy and to plan and conduct the Solicitation for Innovation. Upon successful completion of the RFP, Implementation Plans will be updated. Once an implementer/program design is chosen, the transition will begin for the customer relationship (likely 2018). From a customer perspective, programs will remain the same until such time.

SCE is also the proposed statewide lead for the WISE program, which is one of the downstream programs piloting the statewide model. Table 56 provides additional details for the statewide WISE Program.

Table 56. Statewide WISE Program Details

Program Name: University of California / California State University EE Partnership	
Program Description: The WISE Program achieves energy savings by optimizing water and wastewater agency, special district, city-owned, and other water systems. The program benchmarks each participating customer's pumps, evaluates the pumping system to identify opportunities for improvement and integrated water-energy resource management, develops project feasibility studies, provides project management assistance, performs all measurement and verification services as necessary, and provides technical implementation assistance to drive projects to installation. In addition, the Program provides Water Energy Nexus (WEN) Education and Outreach opportunities to selected water and wastewater system operators. Participating customers are eligible for EE incentives based on calculated energy savings and permanent peak demand reduction above and beyond baseline energy performance standards (i.e., state- and federal-mandated codes, industry-accepted performance standards, and/or other baseline standards as determined by the CPUC).	
Program Objectives: • Implement an IDSM program focused on providing EE solutions to water production, distribution, and treatment systems. The program will focus on mid- to large-sized facilities and systems within the territories of the IOUs as well as some Publicly Owned Utilities (POUs). • Identify and assist customers in installing DSM measures and move projects from conception to installation by focusing on comprehensive innovative technologies and solutions that will deliver increased	**Potential Metrics**: • Number of campuses participating in EE programs quarterly • Quarterly energy savings • Quarterly cumulative energy savings per customer • Cost-effectiveness on a yearly basis

customer participation as well as installation of existing technologies. • Focus efforts on water agencies, special districts, and local government agencies, including water and wastewater treatment and pumping facilities and systems segments.	
Solicitation Strategy: The WISE program was originally launched out of the IDEEA 365 solicitation, was a pilot for approximately 18 months, and was deemed successful. SCE's 2017 Annual Energy Efficiency Program and Portfolio Budget Request, advice letter 3465-E requested permission from the CPUC to move WISE from pilot status to a mainstream third party-implemented program. SCE does not expect WISE to go out for third-party implementation until 2018.	**Transition Timeline:** The transition of program oversight will begin in 2017 with SCE assuming the lead PA role for planning purposes. In 2017, SCE will work with the other PAs (PG&E and SDG&E) to plan and execute on the statewide strategy approach to achieving cost-effective savings as well as the operational structures needed to execute the plan. All third party contracts currently serving this customer segment will continue through 2017. New contracts and statewide implementation would take place in 2018.

(1) LGP Statewide Consistency

Over the last 10 years, the IOUs have closely collaborated with local partners to make LGP programs operate more effectively and efficiently for customers and the communities served. This includes making program offerings, where possible, more consistent across the state. There have been a number of LGP activities that have aligned statewide over the past several years including the statewide Strategic Plan menu, the streamlined statewide Strategic Plan Semi-Annual Reporting template, and LGP performance management metrics. Other activities have aligned across multiple IOUs and are progressing toward becoming consistent statewide, such as expanded direct install program offerings and a move to regionalize partnerships.

There is still room for improvement. Over the next three years, the IOUs will work closely with local partners to drive toward greater consistency across the state, while allowing partners to retain their ability to tailor programs to their local needs. One opportunity for improving consistency across IOUs is to adopt best practices. While all IOUs operate a model that focuses on the three pillars of municipal retrofits, strategic plan support, and core program coordination, each IOU offers its own set of LGP program guidelines resulting in some inconsistency in the delivery of EE resources within a given county or region. Moving

forward, IOUs will adopt consistent program approaches within these multi-IOU partnerships. For example, the IOUs are exploring adopting SCE's Energy Leader tiered incentive model and are also considering adopting PG&E's Direct Install model for LGPs. In addition to aligning programs and adopting best practices, the IOUs are considering other strategies to improve the consistency of LGP administration across multi-IOU LGPs, such as developing consistent reporting requirements, offering similar contract terms and duration, and establishing a lead IOU for each LGP to coordinate joint-program activities within a region.

The IOUs are also working on aligning statewide across Strategic Plan activities. Currently, there is a statewide menu for Strategic Plan Activities as well as a statewide template for Strategic Plan Semi-Annual Reporting. Going forward, the IOUs will look to SCE's new Strategic Plan model for opportunities to be more consistent statewide.

Supporting LGs' access to non-EE funding sources provides another opportunity for statewide consistency. The IOUs will work with the Statewide Best Practices Coordinator or another third-party entity to identify and promote alternative funding sources (both internal and external to IOUs). These sources could be used to strengthen and supplement the work that LGs are already pursuing (e.g., providing broader GHG reduction funding). Funding opportunities could be documented and managed in a database that will be made available to all LGs statewide. In addition, IOUs will explore leveraging LGP resources such as the SEEC Forum and All Partner meetings to provide information and support for alternative funding opportunities (such as Cap and Trade Funding, CEC grants, and Federal grants).

As Core programs ordered to statewide implementation continue to transition, IOUs anticipate that LGPs will benefit from these changes as partnerships actively leverage these Core programs statewide, such as Commercial HVAC, Savings by Design, Primary Lighting, and Emerging Technology.

In support of continuous improvement of statewide consistency, the IOUs will use the CAEECC Public Sector Sub-committee on an ongoing basis to discuss

opportunities to improve program administration, share best practices, and provide a venue to determine whether a given solution should be adopted across the state. Other future opportunities for greater statewide consistency include contracting, core program coordination, and transitioning partnerships to an IDSM focus.

The ultimate goal of EE market transformation programs is to drive the market to a point where the adoption of all cost-effective EE is a standard practice. To that end, over the coming years the IOUs will work closely with key stakeholders to evolve the existing partnership model to transform LGs more effectively toward becoming self-sustaining leaders of EE. Some potential ideas may include adopting EE revolving funds, encouraging a self-funding model for energy managers, and leveraging other sources of funding. These are just a few of the potential options that would be considered by IOUs and stakeholders throughout the state.

b) Regional Strategy Coordination

SCE has worked closely with the Southern California Regional Energy Network (SoCalREN) in their delivery of the Southern California Regional Energy Center (SoCalREC), Finance, and Home Upgrade programs. SoCalGas is the lead PA for contract oversight and SCE provides additional fiscal oversight. The three PAs have also established protocols for proper engagement to help customers avoid confusion and provide clarification on roles. SCE and SoCalGas also have monthly coordination calls and other meetings as needed.

SCE will also support the REN's work on advancing ZNE in the Public sector. This may include continued and expanded coordination with C&S and Emerging Technology in the development of ZNE roadmaps and demonstrations. SCE, SoCalGas, and SoCalREN will continue to work together so that SoCalREN's programs are complementary and not competitive to IOU programs. SCE will work to provide support to SoCalREN for their residential, public agency, and cross-cutting programs.

3. Integration with Cross-Cutting Programs

a) Statewide ME&O

SCE filed its ME&O plan for residential rate reform, including the default of residential customers to expected time-of-use (TOU) rates in 2019, in November 2016 (AL 3500-E). SCE's ME&O plan includes an overarching marketing strategy and integrated approach that addresses all the residential rate reform activities, including providing information on rate structure changes and increases, and on the migration to default TOU rates. Public sector ME&O efforts will align rate reform marketing with other rate-related programs such as California Alternate Rates for Energy (CARE) and California Climate Credit, as well as EE and DR programs.

Public sector ME&O will also align local marketing activities with a broader statewide mass media campaign, including ME&O efforts under the Energy Upgrade California brand. The Public sector will play a critical role in providing a framework for messaging to their communities and constituents on the changes in rate structure.

b) Workforce Education & Training Program

The WE&T section of the Cross-Cutting Chapter provides more details on the program. This section provides high-level descriptions of how WE&T interacts with the Public sector.

In the Public sector, IOU WE&T programs will continue to support the education of decision makers on upcoming code changes and the value of EE, expand access and availability of educational offerings, and continue to look for ways to enhance cross-sector collaborations throughout the EE value chain.

As building code requirements evolve and focus on increased energy savings in support of California's aggressive ZNE goals, LGs and jurisdictions face challenges when pursuing the adoption and implementation of these compliance requirements. SCE will continue to focus Public sector code awareness (via Codes and Standards) efforts through targeted offerings to plan examiners, building inspectors, and other decision makers in

government on baseline code awareness and expected changes in future code, while encouraging the adoption of voluntary or measure-specific reach codes.

SCE will continue to forge new types of collaborations in an effort to expand the accessibility and reach of workshops and seminars targeted to high-potential Public sector decision makers and staff. Expansion of current in-field educational offerings can be accomplished through the partnerships, and the delivery of additional, targeted workshops and seminars using Public sector facilities where many of these market actors work. Online and on-demand workshops and seminars will also be leveraged to provide additional access in hard-to-reach areas, or where in-person delivery is inefficient or unnecessary. SCE seeks to expand online and on-demand offerings to include targeted seminars in the Public sector on code awareness and compliance improvement.

In the areas of post-secondary, adult continuing education, and higher education, SCE will continue to expand influence and activities in the following areas:

- EE and DSM train-the-trainer activity, targeting teaching professionals who work with students in technical, energy-related, and building trades-focused curriculum tracks;
- EE and DSM new curriculum development and existing curriculum infusion, targeting technical, energy-related, and trades-focused tracks;
- SCE will continue to enhance its collaborations and partnerships with other Public sector entities, specifically with the higher education sub-segment, to offer specialized tours, demonstrations, and other targeted offerings through the Energy Education Centers in Irwindale and Tulare; and
- SCE will also collaborate with industry stakeholders to convene industry-specific forums, conferences, and education sessions that seek to bring awareness of both regional energy-related challenges and opportunities to implement integrated customer end-use solutions to

overcome these challenges. One such example of these collaborative initiatives is the Annual Water Conference, hosted by SCE's Energy Education Centers in Irwindale and Tulare. This annual forum is a venue for Public sector stakeholders such as cities, municipalities, regional water districts, and private industry to discuss strategies and opportunities to solve critical water and energy challenges.

c) Emerging Technology Program (ETP)

The ETP section of the Cross-Cutting Chapter provides more details on the program. This section provides high-level descriptions of how ETP supports the Public sector.

The statewide ETP has a number of long-running partnerships with the Public sector that have proven to be beneficial for both parties and have moved statewide initiatives forward. ETP has collaborated with schools and universities, public hospitals, water and wastewater treatment facilities, military bases, and federal, state, county, and local government agencies. The ETP supports these entities by evaluating new technologies, identifying energy-saving technologies that are economically viable, and exploring innovative solutions that some public buildings are uniquely positioned to adopt.

The statewide ETP helps to advance the state's GHG reduction goals by evaluating commissioning solutions and offering support for technologies that can decrease overall Public sector energy expenditures, such as LED street lighting and municipal water distribution leak analysis.

The traditional Emerging Technologies (ET) support for legacy EE programs that lessen financial obstacles to adopting energy-saving technologies is critical. Consequently, even as the ET portfolio diversifies over the coming years to include new and innovative types of solutions, the statewide ETP is also committed to maintaining a robust set of "traditional" measures in the ET portfolio. This approach will help program implementers maintain a suite of measures that can benefit many Public sector customers.

Conversely, the economics of the Public sector sometimes allow facilities to explore EE upgrades with a payback period that would be out of reach for financially challenged customers. For these Public sector customers, ETP can offer expertise and support for pilot demonstrations. The ETP also works to accelerate the time-to-market period for emerging solutions that may be too new or difficult to justify for smaller customers, but may be a good fit for some public facilities.

d) Codes and Standards (C&S)

The C&S section of the Cross-Cutting Chapter provides more details on the program. This section provides high-level descriptions of how C&S supports the Public sector. The primary areas of interaction between the Public sector and C&S are in reach code program activities and code compliance.

(1) Reach Code Program Activities

The LG segment of the Public sector is a leader in addressing climate change and is well-positioned to reduce emissions from certain sources, especially by reducing the demand for electricity and natural gas through adopting local "reach codes" that exceed the State's energy code requirements.[294] Reach codes allow LGs to aggressively pursue the CPUC's goal of achieving ZNE. The IOUs are collaboratively offering technical assistance statewide to local governments that wish to develop and implement local ordinances designed to reduce energy use, energy costs, and GHG emissions.

SCE will prepare cost-effectiveness studies for all climate zones in California and will make them available for all jurisdictions at no cost. Performance-based cost-effectiveness studies will be prepared pursuant to CALGreen Tiers 1 and 2[295] for both

[294] State of Local Climate Action: California 2016, Statewide Energy Efficiency Collaborative, October 2016. Page 28 describes Local Governments' efforts on Reach Codes. More information is *available at* http://californiaseec.org/2016/10/state-of-local-climate-action-california-2016-details-local-climate-leadership-in-the-state/

[295] CALGreen, short for California Green Building Standards Code, is a statewide building code that establishes standards for environmental impact. CALGreen Tier 1 buildings have a 15 percent or greater reduction in its Energy Building component. CALGreen Tier 2 exceeds that standard by more

nonresidential and residential uses, and pursuant to CALGreen Tier 3 for residential uses only. Prescriptive-based cost-effectiveness studies will be prepared for cool roofs, lighting, and water efficiency systems. SCE will also work collaboratively with RENs and local jurisdictions to:

- Leverage voluntary measures incorporated in CALGreen Tiers as primary sources for prescriptive-based reach code ordinances. This will enhance regional consistency and eliminate the current CEC reach code application process;
- Develop tools to track, quantify, and report energy savings and GHG emissions reduction for both performance-based and prescriptive-based reach code ordinances; and
- Help explain to local officials the process for developing and adopting a legally enforceable reach code, pursuant to CEC requirements.

(2) Code Compliance

As building code requirements evolve to focus on increased energy savings in support of California's aggressive ZNE goals, local governments and jurisdictions face challenges when pursuing the adoption and implementation of these compliance requirements. SCE's C&S and WE&T programs and offerings will continue targeted offerings to plan examiners, building inspectors, and other decision makers on baseline code awareness and expected changes in future code, while encouraging the adoption of voluntary or measure-specific reach codes.

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than 30 percent. CALGreen Tier 3 is not yet an official tier, but instead is referred to as zero net energy design. More information can be found on page 71 of the CALGreen. Appendix 4, Residential Voluntary Measures, *available at* codes.iccsafe.org/app/book/content/2016%20California%20Codes/Green/Appendix%20A4%20Residential%20Voluntary%20Measures.pdf

Energy Code Ace is a tool that was developed and provided by the Statewide C&S Program to provide energy code training, tools, and resources for those who need to understand and meet the building codes, including:

- Tools to help identify the proper forms, installation techniques, and standards;
- Classroom and online trainings; and
- Resources such as sheets and checklists to understand how to comply with the code.

The Statewide C&S Program has also developed a Compliance Improvement (CI) Collaborative. The CI Collaborative allows relevant stakeholders, including those developing, those implementing, and those enforcing statewide building standards, to have a forum to discuss issues and "real world" implications of building energy codes.

4. <u>EM&V Data Collection Needs and Anticipated Study Needs</u>

The Public sector needs a series of market characterization studies in order to: (1) document ISPs specific to the Public sector, particularly in operations, maintenance, and early replacement or "indefinite repair" practices, which may differ in different segments within the sector, and (2) conduct an end-use saturation survey (due to the fact that many government buildings are not subject to code requirements, it is important to understand the saturation of measures in the Public sector).

For LG and Institutional Partnerships, implementers have experience in including data collection activities in their program design. For example, core programs usually wish to collect contact information from customers who attend a core program coordination event. However, in practice, these data collection activities are costly and subject to self-selection biases, and often rewards must be offered to persuade implementers to ask for and customers to submit their contact information. The Implementation Plans for the Public sector will contain details of data collection activities that will strike a balance between costs and benefits, and these

data collection activities will be closely tied to both program metrics and to planned evaluation activities.

SCE and the other IOUs have begun exploring ways to use automated meter infrastructure (AMI) billing analyses to show NMEC at the meter. The Implementation Plans will also include data collection activities to support these billing analyses. SCE expects that AMI billing analyses, supplemented by data collection activities embedded in program design, will allow internal performance analysis during deployment.

IX.

Cross-Cutting Sector

A. Cross-Cutting Sector Goals

The Cross-Cutting Sector consists of the C&S Program, the ETP, and the WE&T Program. SCE's primary goal for the Cross-Cutting Sector is to achieve 421 GWh in electric energy savings and 106 MW in demand savings through the C&S Program in 2018. SCE is not able to count savings achieved as a result of ETP or WE&T efforts. Table 57 shows SCE's annual savings forecasts for the Cross-Cutting Sector through 2025 (including claimed savings for 2015 and projected savings for 2016 and 2017). The table includes specific savings goals for each of the Cross-Cutting programs. These forecasts are based on the overall portfolio goals from D.15-10-028. As explained in the Portfolio Summary chapter, they will be updated in 2017.

Table 57. SCE's EE Cross-Cutting Sector Savings Forecast 2018-2025

PY	C&S kWh Savings	ETP kWh Savings	WE&T kWh Savings	Total Sector kWh Savings	C&S kW Savings	ETP kW Savings	WE&T kW Savings	Total Sector kW Savings
2015[296]	640,989,575	N/A	628,025	641,617,600	147,349	N/A	193	147,542
2016[297]	619,000,000	N/A	163,763	619,163,763	144,000	N/A	35	144,035
2017[298]	660,569,234	N/A	N/A[299]	660,569,234	128,585	N/A	N/A[300]	128,585
2018	421,000,000	N/A	N/A	421,000,000	106,000	N/A	N/A	106,000
2019	414,011,400	N/A	N/A	414,011,400	106,996	N/A	N/A	106,996
2020	393,021,022	N/A	N/A	393,021,022	104,001	N/A	N/A	104,001
2021	337,015,526	N/A	N/A	337,015,526	97,001	N/A	N/A	97,001
2022	304,021,706	N/A	N/A	304,021,706	92,006	N/A	N/A	92,006
2023	262,005,907	N/A	N/A	262,005,907	87,010	N/A	N/A	87,010
2024	246,992,968	N/A	N/A	246,992,968	84,008	N/A	N/A	84,008
2025	254,402,757	N/A	N/A	254,402,757	86,528	N/A	N/A	86,528

B. Codes & Standards (C&S)

1. C&S Market Characterization

a) Overview

The current statewide C&S Program ("C&S 1.0") has contributed to California's EE success by advocating for robust building codes and appliance standards at the state and federal level. In parallel, California policymakers have continued to set a variety of important energy and climate policy goals via legislative bills, executive orders, and state agency action plans. These statewide goals are diverse in scope, including targets over the next 35 years for GHG reductions, EE, renewable energy, energy storage, ZNE buildings, water efficiency, grid integration, and clean transportation. The "C&S 2.0" vision builds upon the most successful

[296] Claimed savings.

[297] Projected savings.

[298] Projected savings.

[299] WE&T savings in 2015 and 2016 are for the WE&T Connections subprogram, which SCE anticipates closing. Therefore, SCE does not expect any WE&T savings after 2016.

[300] *Id*.

strategies from the current program and integrates more long-term, code-directed industry transformation actions that enhance portfolio activities directed at achieving state policy goals.

b) Customer Landscape

C&S activities affect many stakeholders in the building industry supply chain. Appliance standards affect all customers who purchase regulated products. As such, the influence of C&S has an effect on virtually all customers. With respect to advocacy engagement, the main stakeholders include those who influence the standard up to and throughout the rulemaking process and implementation. In addition, code development bodies such as the CEC, DOE, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), and the International Code Council (ICC) are the direct recipients of the C&S Program's advocacy work and are therefore, the principle "customer" of the Program. Other C&S Program customers and stakeholders include, but are not limited to:

- Local, state, and federal government agencies;
- Utility partners, including California IOUs, non-California based IOUs operating in California, municipal utilities, national utility partners, third-party implementers, and trade professionals;
- Standards and ratings organizations;
- Enforcement agencies including building inspectors, building plan examiners, and building official advocacy groups;
- SoCalREN, regional partnerships and advocacy groups;
- Construction industry professionals;
- Construction industry suppliers; and
- Building owners, occupants, and consumers.

c) Trends

The following section describes specific trends that affect the C&S program.

(1) Ambitious State Policy/Regulatory Drivers

During the last several years, the Commission has reinforced the importance of the C&S Program. Figure 27 summarizes key Commission policies related to the C&S Program.

Figure 27. Key CPUC Policies Related to Codes and Standards

Warren-Alquist Act	Long Term EE Strategic Plan	ZNE Action Plans	Decision 07-10-032	Decision 12-05-015	Decision 16-08-019
• **§ 25402.7. Utility support for building standards** • (a) In consultation with the commission, electric and gas utilities shall provide support for building standards and other regulations pursuant to Section 25402 [bldg stds] and subdivision (b) of Section 25553 including appropriate research, development, and training to implement those standards and other regulations.	• Expand Titles 24 and 20 to address all significant energy end uses. • Improve coordination of state energy codes and standards with other state and federal regulations. • Greater convergence of C&S and DSM. • Improve code compliance and enforcement.	• Align the development and implementation of regulations, policies, plans, incentives, and codes related to ZNE buildings. • Establish a long-term progressive path towards ZNE Codes & Standards by 2020 (res) and 2030 (nonres). • Lower the threshold for applying codes to existing buildings.	• **2009-11 Goals Decision** • The utilities' proposed 2009-2011 portfolios must identify "an 'end game' for each technology or practice that transforms building, purchasing, and the use decisions to become either 'standard practice', or incorporated into minimum codes and standards.	• **2013-14 Portfolio** • The Staff Proposal calls for "a redesign of the statewide codes and standards program," placing it in "a central strategic position within the IOU energy efficiency portfolio."	• Rolling Portfolio Decision re: EE Goals for 2016 and beyond and EE Rolling Portfolio Mechanics • "The approach we adopt follows a hierarchy, with the strategic plan at the top, guiding business plans, which in turn guide budgets and implementation plans"

The State government has enacted several policy goals through legislation that have impacts on codes and standards. Some of these legislative actions are identified in Figure 28.

Figure 28. Select California Policy Goals that Affect C&S

	2020	2025	2030	2050
Greenhouse Gases	1990 levels (AB 32)		40% below 1990 levels (SB 32)	80% below 1990 levels (E.O. B-30-15)
Efficiency			2x energy efficiency goals[1]	
Zero Net Energy Buildings	100% of new Res.[2]	100% of new state buildings[2]	100% of new Com., 50% Com. Retrofits[2]	
Renewable Portfolio Standard	33%[3]		50%[1]	
Transportation		1.5 million ZEVs[4]		
Fuels			Displace 30% of petroleum use with alternative fuels[5]	
Water	20% less water per capita in Res. & Com. buildings[6]			
High-GWP Gases	Reduce GHG emissions from HFCs by 10 MMtCO2e[7]			
Energy Storage	1.3 GW Storage Procurement[8]			

1. Senate Bill 350
2. CA's *Long Term Energy Efficiency Strategic Plan*
3. Senate Bill X1-2
4. Governor's ZEV Action Plan
5. Assembly Bill 1007
6. Senate Bill X7-7
7. AB 32 Scoping Plan (CARB)
8. CPUC D.10-03-040

Supporting Agencies

(2) Increasing Complexity in DSM Program Industries

DSM program infrastructure has become increasingly complex, particularly in California. As standards are created or advanced that affect more industries and stakeholders, the landscape of agencies involved in standards development, adoption, and compliance support also grows. Once a vertically integrated business largely administered and implemented by the IOUs, the DSM industry now includes third-party implementers, government partnerships, SoCalREN, CCAs, and DR aggregators. As complexity increases, so do the resources needed to coordinate.

(3) Focus on Existing Buildings

Although codes and standards are generally aimed at new buildings, existing buildings offer an opportunity for potentially much larger savings for the C&S program. As the code for new construction rapidly approaches ZNE targets for residential buildings, and nonresidential goals follow closely behind, there remain fewer cost-effective opportunities to increase the stringency for new buildings. On the other hand, existing buildings far outnumber new construction and offer an opportunity for greater savings. In particular,

dramatic increases in the EE of appliances and system solutions in existing buildings are necessary to achieve SB 350 goals. Existing buildings have sector-specific challenges, including a broad variety of project types, design and construction arrangements, and constraints caused by cost and existing conditions. Recognizing this, state building energy codes, once viewed as primarily targeting new buildings, now address both building types. Certain segments of the building renovation industry have resisted an expansion of codes and standards applying to existing buildings, citing cost barriers and frustrations with code complexity.[301]

(4) Multifamily (MF) Buildings

Although residential codes and standards have historically focused on single family (SF) homes, the focus needs to shift to MF housing since recent trends have shown a sharp increase in new MF housing. The low-rise MF sector presents both opportunities and challenges in achieving ZNE by 2020. MF construction has recently experienced significantly more rapid growth than the SF home construction market. As shown in Figure 29, MF construction began out-pacing SF construction at the state level in 2012.[302]

[301] Refer to CEC docketed comment from Gene Thomas, Ecology Action, regarding his frustration with lighting retrofit requirements in the Title 24 building energy standards, *available at* http://www.energy.ca.gov/title24/2016standards/rulemaking/documents/comments_pt_1-6/Ecology_Action_-Gene_Thomas_Opening_Comments_on_the_Proposed_2016_Title_24_Part_6_45-Day_Language_2015-02-27_TN-75279.pdf.

[302] Public Policy Institute of California ,California Housing Challenges Continue,(Jan. 2016), *available at* www.ppic.org/content/pubs/report/R_116HJ2R.pdf

Figure 29. MF Permits 1998-2015

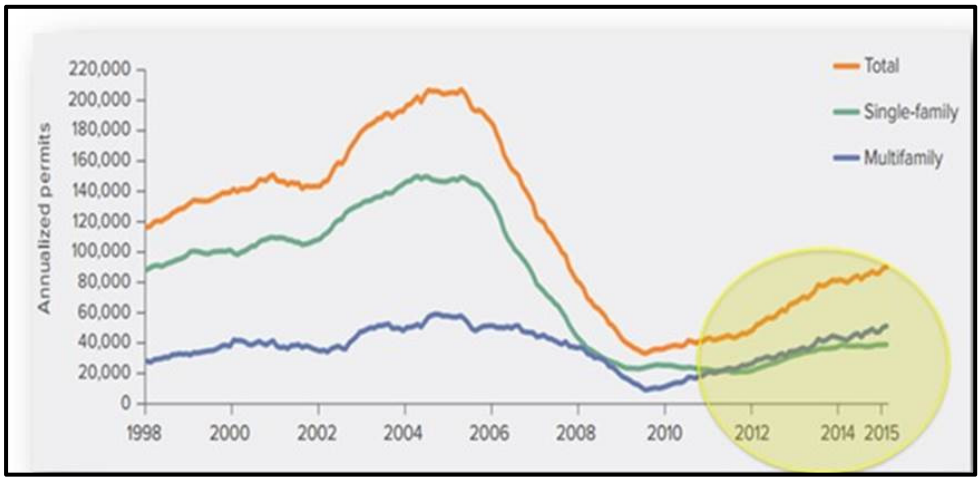

Table 58 includes statistics regarding MF construction in the top three California markets in 2015 that provide important information for planning C&S advocacy in the coming years:

Table 58. MF Construction Statistics[303]

Statistic	Los Angeles Metro	San Francisco Metro	Orange County Metro
Increase in overall new construction permit activity relative to historic metro norm	74%	69%	53%
Increase in annual MF permit activity relative to historic metro norm	161%	102%	136%
Decrease in SF permit activity relative to historic metro norm	44%	36%	24%
MF percent of 2015 permits	81%	89%	67%

1 **2. Gaps and Barriers**

2 a) Conflicting Policy or Gaps in Policy

3 California has a forward-thinking energy policy framework; however,
4 conflicts arise in situations when adopted legislation does not include implementation plans,
5 identified funding mechanisms, timelines that align with other policies, and identified success
6 measures. For example, the ZNE goals stated in the CLTEESP do not fully align with the GHG
7 reduction goals of AB 32 in terms of metrics, measurement, and milestones.[304] The ZNE goals
8 also do not align with policies that directly focus on DERs and the respective evolution of the
9 energy grid. Lastly, while the CEC's building energy standards (Title 24, Part 6) accommodate a
10 robust set of integrated building requirements for energy savings, renewable generation, and
11 energy storage/DR, many of these requirements are addressed in separate CPUC proceedings,
12 which can cause timing and policy misalignment.[305]

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[303] Finance, C. D. (2016, August 15). California Department of Finance Construction Permit Data. Retrieved from California Department of Finance, *available at* http://www.dof.ca.gov/Forecasting/Economics/Indicators/Construction_Permits/
Hepp, S. Trulia's Blog: Home Buying and Selling (Aug. 2015). Retrieved from Trulia: https://www.trulia.com/blog/trends/hot-construction-markets-2015/

[304] California Long Term Energy Efficiency Strategic Plan, CPUC, September 2008 (updated Jan. 2011) uses energy as the metric for achieving ZNE, and California Assembly Bill 32, California Global Warming Solutions Act of 2006, uses the metric of pounds of equivalent carbon dioxide. Neither document directly calculates an equivalency between energy with carbon dioxide.

[305] R.13-09-011, R.15-03-011, and R.13-12-010.

b) Federal Preemption

Federal preemption is the invalidation of any state law that conflicts with federal law, and for appliance efficiency regulations, minimum federal standards cap state appliance standards. For example, after commercial clothes washer standards (first adopted by California in Title 20 in 2003) became federally covered products through EPAct 2005, California could no longer update standards beyond federally adopted efficiency criteria for commercial clothes washers.[306] Federal law includes an option for states' energy commissions to petition the DOE for a preemption waiver, but no state has successfully done so and it is not a practical option.[307] As the scope of DOE's appliance program expands, it becomes increasingly important for the C&S Program to meaningfully participate in the federal rulemaking process. It also means that there are fewer appliances available to the CEC to incorporate into Title 20. It is also critical that for the remaining appliances California is able to regulate, the proceedings are completed quickly to transform the market and set a high bar before the DOE begins its rulemaking process for those appliances. This is important because the DOE process is much longer than the CEC's process, stranding cost-effective energy savings that could contribute to achieving California's policy goals. Federal standards cover more than 60 product categories that represent approximately 90 percent of home energy use, 60 percent of commercial building energy use, and 30 percent of industrial energy use.[308]

c) Miscellaneous Electrical Loads

To achieve ZNE in California, special attention must be given to miscellaneous electrical loads (MELs) and EVs. Many types of MELs have a relatively shorter

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[306] "Notice of Denial of a Petition for Waiver from Federal preemption," Federal Register / Vol. 71, No. 249 / Thursday, December 28, 2006 / Notices, Department of Energy, *available at* https://www.gpo.gov/fdsys/pkg/FR-2006-12-28/pdf/E6-22270.pdf

[307] Refer to http://www.energy.ca.gov/appliances/clotheswashers/ regarding the CEC's failed legal attempt to seek an exemption from federal preemption for clothes washers that provides more detail. As a result of this case, the CEC has not considered petition waivers as a practical option

[308] U.S. Department of Energy, Appliance and Equipment Standards Program, *available at* http://energy.gov/eere/buildings/appliance-and-equipment-standards-program.

product cycle (for example, cell phones, tablets, smart watches, etc.). Energy Star® and various voluntary standards at the national level, even though they cannot be fully enforced, are potential paths for establishing energy savings because even voluntary standards achieve some market transformation and may at some point be ready to become code. This type of new approach will require some policy changes, including EM&V methods.

d) Recognized Need for Fully Integrated DERs

Achieving ZNE for new and existing buildings and maintaining transmission and distribution (T&D) grid stability requires demand flexibility through the integration of various systems in buildings and communities, such as:

- Implementation of precooling and preheating;
- Connected building energy management systems to facilitate buildings' response to dynamic grid needs;
- Expansion of DR (for reliability, over-generation, and economic benefits);
- Implementation of alternative fuels and EV infrastructures; and
- Integration of photovoltaics (PV) and battery storage.

Understanding these emerging integrated energy systems requires more research and analyses to plan for their place in C&S. With rapidly approaching ZNE goals and relatively short code cycles, this work must accelerate.

e) Data Deficits

Regulatory code-setting agencies such as the CEC, DOE, ASHRAE, and ICC are required to show feasibility of proposed standards. Successful standards are built on defensible, current, and rigorously researched data. As technologies advance towards being codified, collecting information that demonstrates the viability of the technology and its role in energy efficient systems is critical. The statewide C&S Program has found that accurate and useful data on the performance of newer technologies and a thorough understanding of what impact widespread adoption will have on the intended system is frequently not available.

Examples of this include the lack of EE test protocols and standards for light dimming systems or for energy storage systems, like batteries. Market analysis and impacts that directly related to the code-making process collected through laboratory testing, field surveys, and demonstrations will help fill data shortfalls.

f) Title 24, Part 6 Compliance Software

To meet upcoming ZNE building codes, building designs will require the incorporation of advanced and complex energy systems. The compliance software tools will need to offer new functionality to allow design projects to analyze these advanced strategies and demonstrate that projects meet the ZNE goals.

The integration of the Title 24, Part 6 compliance software, California Building Energy Code Compliance-Commercial/Nonresidential Buildings (CBECC-COM), with DOE's EnergyPlus simulation engine is an ongoing process. The primary focus of integration to date has been to develop functionality and energy measures for conventional designs that meet or exceed minimum compliance. Additional development must occur for CBECC-COM to be able to model the breadth of design strategies available in EnergyPlus that may be employed in high performance and ZNE buildings.

g) MF Buildings

MF housing have many sub-types that make it challenging to address the sector with regard to building standards. MF includes some of the following common configurations: two-story townhomes, three-story apartments, and four-story vertical mixed-use apartments over a commercial space, such as a café or retail store. Each type has different occupancy and energy use intensities that are specific to the type. For example, low-rise MF building construction is covered by residential building standards similar to SF residential. Given the energy use intensities associated with MF, this approach creates some unintentional issues regarding such things as misaligned standards related to hot water, HVAC, and common areas. This causes confusion among developers, architects, and building officials. There is an

immediate need to assess MF building energy standards to address the specific energy use characteristics associated with low-rise and high-rise MF projects.

3. Value

a) Roles for C&S Within the Cross-Cutting Sector

The C&S Program serves a diverse customer landscape, and plays a cross-cutting role in supporting Residential, Non-residential, and Public sectors. Accurate data derived from code-driven research and market analysis to support the development of effective standards is also a resource to program developers and implementers serving the customers. Because the C&S Program works closely with the CEC and other market actors, it is often on the forefront of the issues and addressing questions for many of the organizations. This allows the C&S Program to be in an excellent position to share the knowledge gleaned through existing relationships.

b) Support for Portfolio

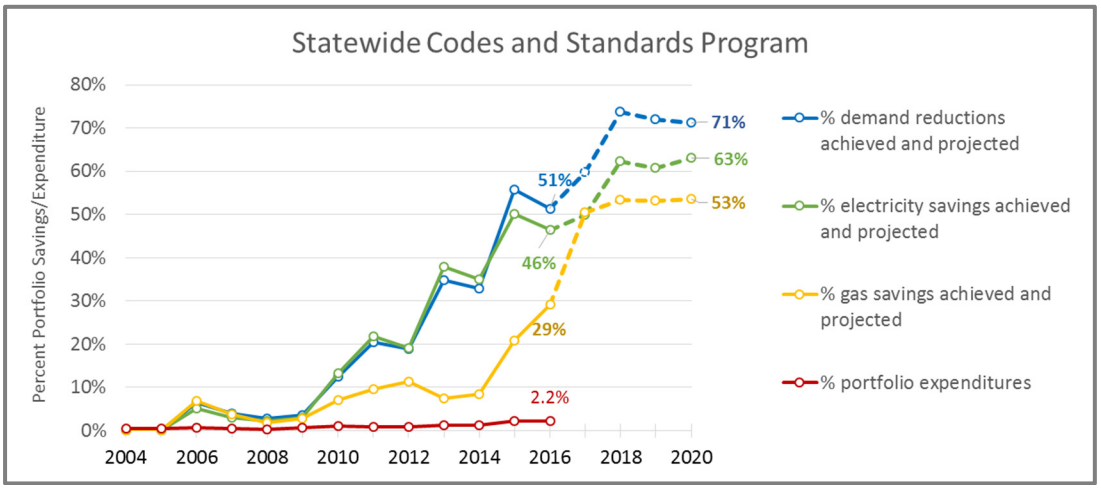
The C&S Program is an extremely cost-effective program, and savings continue to accrue for many years following C&S Program advocacy activities. In 2016, with a budget of approximately 2.2 percent of the portfolio total, the C&S Program will generate approximately half of the portfolio electric savings (46 percent electricity consumption, 51 percent electricity demand) and almost one-third (29 percent) of gas savings.[309]

The program timeline results in advocacy efforts being conducted several years prior to realizing the savings. The savings shown in Figure 30 show that measures adopted because of C&S Program efforts conducted through March 2016 will continue to produce

[309] The estimated demand, electricity, and gas percentages are calculated by dividing the C&S savings by the total portfolio savings (C&S and incentive programs). The C&S Program savings are based on adopted standards (thru March 2016) for which Statewide IOU team conducted advocacy efforts. The C&S savings are derived from either CPUC Impact Evaluations (for standards that became effective in 2006 thru 2012) or IOU estimates (for standards that become effective in 2013 and beyond). The incentive program savings are estimated based on CPUC evaluation results (for savings from 2004 to 2012), IOU estimates (for savings from 2013-15), and incentive programs goals provided in the CPUC Decision 15-10-028 (2016 and beyond). Per prior CPUC policy, C&S Program savings are net and incentive programs savings are gross. Note: the August 2016 CPUC decision D.16-08-019 has now recommended that incentive program goals be measured in net goals rather than gross goals to address potential free ridership concerns.

savings equal to more than half of the total portfolio savings through 2020. The activities described in this business plan will produce savings from appliance and building standards scheduled for adoption before 2020 and will set the stage for a stream of savings to be realized in future code cycles.

Figure 30. Codes and Standards Program Budget and Savings in Context[310]



c) Benefits to Customers

The Statewide C&S Program helps California's customers save energy by:

- Achieving progress toward CPUC, CEC and California Air Resources Board (CARB) policy goals;
- Reductions in energy bills;[311]

[310] The estimated demand, electricity, and gas percentages are calculated by dividing the C&S savings by the total portfolio savings (C&S and incentive programs). The C&S Program savings are based on adopted standards (thru March 2016) for which Statewide IOU team conducted advocacy efforts. The C&S savings are derived from either CPUC Impact Evaluations (for standards that became effective in 2006 thru 2012) or IOU estimates (for standards that become effective in 2013 and beyond). The incentive program savings are estimated based on CPUC evaluation results (for savings from 2004 to 2012), IOU estimates (for savings from 2013-15), and incentive programs goals provided in D.15-10-028 (2016 and beyond). Per prior CPUC policy, C&S Program savings are net and incentive programs savings are gross. [Note: D.16-08-019 has required that future incentive program goals be measured in net goals rather than gross goals to address potential free ridership concerns].

[311] Annual bill reductions per home resulting from the Statewide C&S program advocacy is estimated at $400/y for newly constructed homes and $100/y for existing homes. See slide 4 of the May 4, 2016

- Coordinating with other IOU programs and entities to support the state's energy policy goals;
- Enabling buildings to uncover additional value streams by functioning as grid assets;
- Providing a solution for the "split incentive" problem faced by a larger percentage of customers who are tenants;[312]
- Supporting building design teams, contractors, customers, and government agencies to improve their ability to comply with codes and standards; and
- Assisting local governments in developing ordinances that exceed statewide minimum requirements.

d) External Impacts and Benefits

Codes and standards have far-reaching impacts throughout California (including non-IOU service territories) and beyond. California frequently leads the nation in setting stringent codes and standards and many of the benefits realized in California spill over nationally and internationally. When a code or standard is adopted, it begins to transform the market, and the covered technology (or equipment or activity) typically becomes standard. The effects of these market changes provide significant benefits to both IOU and non-IOU customers throughout the state. This benefits those who participate in IOU incentive programs as well as those who do not, as the CEC estimates that savings from implementation of the 2016 building standards will reduce annual statewide GHG emissions by 160,000 metric tons of CO2e.[313]

Stage 2 Statewide C&S presentation for the EE Coordinating Council, *available at* http://media.wix.com/ugd/0c9650_7b6b1a4581114c73b658ca50b37ba625.pdf

[312] Many landlords purchase appliances and equipment, including lighting and HVAC, based upon cost so the improved standards provide the best chance for improved EE for tenants.

[313] 2016 Building Energy Efficiency Standards, June 2015, *available at* http://www.energy.ca.gov/2015publications/CEC-400-2015-037/CEC-400-2015-037-CMF.pdf

In addition, the economic benefits continue to accrue with each transaction following code adoption. This translates to reduced operating costs which directly affect the bottom line for multiple stakeholders, including:

- **Local governments:** increase ability to meet local goals, such as Climate Action Plans, through supporting standards implementation as determined by the California Environmental Quality Act (CEQA);
- **Local businesses**: increase profits, reduce prices; and
- **Homeowners and residents:** lower energy costs, increase in discretionary income.

4. Codes & Standards Vision and Opportunities

a) Codes and Standards Vision

SCE's vision for its C&S Program is to build upon the most successful strategies from the current C&S Program and integrate more long-term, code-directed industry transformation actions that enhance portfolio activities directed at achieving state policy goals. The current statewide C&S Program ("C&S 1.0") has contributed to California's EE success by advocating for robust building codes and appliance standards at the state and federal level. In parallel, California policymakers have continued to set a variety of important energy and climate policy goals, expressed in legislative bills, executive orders, and state agency action plans. These statewide goals are diverse in scope, including targets over the next 35 years for GHG reductions, EE, renewable energy, energy storage, ZNE buildings, water efficiency, and clean transportation.

b) Codes and Standards Opportunities

(1) Changes to the Existing Program:

The planning and coordination subprogram will be expanded to support portfolio planning efforts aimed at state policy goals and grid integration including the state's residential and commercial building ZNE goals. Particular focus will be on supporting the residential building industry on meeting residential new construction ZNE goals by 2020.

Research, data collection, and market analysis will be significantly increased to include expanded lab testing, field surveys, tear down analyses, collection of cost data from web, etc.

The scope of the C&S Program will expand to include IDERs and other technologies that enable demand flexibility (controls, thermal storage, phase change materials, pre-cooling, pre heating, DR-enabled appliances, grid integration, compliance software capable of modeling storage trade-offs, etc.). Particularly as ZNE buildings transform the capabilities of buildings to act as grid assets.

Evaluation indicators will be established for key industry and market transformation results (e.g, increase in code feasibility) from reach code projects and new construction programs, such as Savings By Design. This will take the portfolio a step closer to the "integrated" vision presented in D.12-05-015.[314]

5. Subprograms Supporting the C&S 2.0 Vision [315]

The following existing, expanded, and new subprograms will be used to implement C&S 2.0.

a) Existing Subprograms

Planning and Coordination subprogram. The C&S Program will expand activities to include working with DSM incentive and EM&V staff, other cross-cutting programs (ETP in particular), and IOU T&D staff to establish long-term goals for certain building types, systems, and equipment. Combining the policy goals with the program's vision, the teams will then develop integrated plans with clear near-, mid-, and long-term activities. Each integrated plan will support one or more of the statewide policy goals. Given the increased integration efforts with other programs, C&S will work towards informing new EM&V studies that appropriately assess and incent collaboration. The C&S Program will also be enhanced to

[314] D.12-05-015 at p. 246 provides Guidance on 2013-2014 Energy Efficiency Portfolios and 2012 Marketing, Education and Outreach,

[315] Background on existing activities for each subprogram are discussed in Section C ("Discussion of Opportunities and Near-, Mid-, Long-term Strategies") and elsewhere throughout the chapter.

include ZNE-preparedness activities to support the building industry in reaching ZNE with a specific emphasis on residential new construction. The more immediate goal of these activities will be to provide a "crosswalk" for the residential new construction building industry from the current building code (2016 Title 24) to the next version that will be ZNE or partial ZNE (2019 Title 24). C&S and ETP will continue to coordinate activities to leverage the success of past and future ZNE ET projects. Chapter IV (Section 10b, Coordination with Other Programs, ETP and the Codes & Standards Program) includes additional details about C&S and ETP coordination on ZNE in the Residential Sector. ZNE for Nonresidential new and existing buildings will also receive emphasis as goals and milestones are closely following those for the Residential Sector.

State Building Codes Advocacy subprogram: Refer to PG&E's business plan for more detail.

State Appliance Standards Advocacy subprogram: Refer to PG&E's business plan for more detail.

b) Expanded Subprogram Activities

Compliance Improvement subprogram: The C&S Program will collaborate with SoCalREN to expand activities to:

- Support CEC's e-infrastructure improvements intended to simplify and modernize the Title 24 and Title 20 compliance process;
- Collaborate with the advocacy subprograms to simplify code requirements when appropriate; and
- Expand appliance standards compliance improvement work to reach more market actors and encourage compliance especially in appliance categories where significant savings would be captured from an increase in available compliant products.

Reach Codes subprogram. The C&S Program will collaborate with SoCalREN to expand activities to support LGs' increased focus on adopting ordinances requiring measures beyond traditional EE measures. These measures would include: voluntary standards,

renewable energy, alternative fueled vehicle infrastructure, energy storage, DR, and water saving measures. As local governments adopt ZNE ordinances using resources from the C&S program, provide ZNE support from the Planning and Coordination Subprogram to the building industry.

c) Proposed New Subprograms

National and International Standards Advocacy Subprogram: This new subprogram will focus on national and international regulations including voluntary codes, standards, and testing procedures that directly and indirectly affect IOU customers in California. The C&S program will increase engagement and coordination with interested California delegations to increase alignment between national and international standards and California goals.

Code Readiness Subprogram: This subprogram is specific only to PG&E with much of the same work completed through SCE's C&S Program (under Planning and Coordination and Reach Codes subprograms), ETP, and in conjunction with EE incentives programs, EM&V, and other internal SCE organizations.

6. Discussion of Opportunities and Near, Mid, and Long-Term Strategies

Moving toward code-directed industry transformation goals, the C&S 2.0 Program will continue successful program elements and platforms while expanding operations and effectiveness within the cross-cutting sector. The new opportunities and strategies are informed via various inputs and experiences, including public workshops, compliance-related training and outreach, and state agency feedback. The intervention strategies and tactics listed below are organized by subprogram, but some may be implemented across subprograms. For this section of the cross-cutting sector chapter, the subprograms act as strategies.

a) Planning and Coordination Subprogram

Background. Since 2013, the CPUC emphasized the need for a more integrated process for coordinating C&S activities throughout all of the IOUs' EE sectors.[316] In

[316] D.12-05-015 p. 246.

response, C&S implemented the Planning & Coordination (P&C) Subprogram. This Subprogram incorporates an integrated, dynamic approach coordinating and aligning strategic planning within the EE portfolio, identifying priorities for the building and appliance code advocacy subprograms.

California's increasing commitment to EE has resulted in a growing number of state policy goals, expressed in Executive Orders, legislative bills, and state agency action plans. California is currently at the forefront of a fundamental power system transformation towards a cleaner, more diverse "plug and play" grid[317] that integrates an ever-growing set of DERs and technologies that include DR, EV infrastructure, PV systems, and battery energy storage. Specific emphasis will be put on "ZNE preparedness" -- supporting ZNE buildings with a focus on supporting the home building market actors to support the state policy goals of achieving ZNE for all new homes by 2020. As a result, Codes & Standards P&C Subprogram activities will expand to address the growing number of state policy goals while supporting the development of a "plug and play" grid that is safe and reliable. Table 59 describes the P&C Subprogram strategies and tactics.

Table 59. Planning and Coordination Subprogram Strategies and Tactics

Planning and Coordination Subprogram Needs	C&S Objective	CS& Strategies
Coordinate C&S activities across the PA territories.	1. EE program stakeholders are able to coordinate their approach to achieve state EE goals for code and ZNE adoption.	PC-1.Convene a forum where IOU EE portfolio programs can coordinate actions to prepare the market for future code and ZNE adoption.
	2. State agency stakeholders are able to contribute to the development of a "plug and play" grid.	PC-2. Convene a forum where EE PAs, market actors, and C&S stakeholders can discuss standards for a "plug and play" grid.
	3. EE PAs have the information needed to design programs and incentives that anticipate upcoming code changes.	PC-3. Lead strategic planning activities with PAs to identify synergistic priorities between EE programs and the building and appliance code advocacy programs.

[317] The Emerging Clean Energy Economy, September 2016, SCE. Paper explains that the utilities must modernize the electric grid to respond to customer demands of having a clean, plug and play grid that can accommodate customer solar energy generation, batteries and other distributed energy resources.

Tactics	New or Modified Tactic?	Objective	Near-term = 1-2 yr. Mid-term = 3-6 yr. Long-term = 5-15 yr.
Lead the establishment and facilitation of a communications forum with regulatory agencies and critical stakeholders to appropriately structure and phase in DERs as they relate to advancing codes and standards.	New	1, 2	Near-, Mid-, and Long-Term
Lead the establishment and facilitation of a communications forum with internal utility T&D system organizations, including grid operations, distribution and transmission planning, load forecasting, and line extension policies.	New	2	Near-Term, Mid-Term
Lead the continuation of existing strategic planning activities and enhance coordination across the EE portfolio and other IDER groups, by developing new tools to communicate existing standards and future work.	Mod	2, 3	Near-Term
Support development of technology trajectories that incorporate market transformation tools available to specific EE portfolio programs to facilitate future adoption by state or federal building and/or appliance codes.	Mod	3	Near-, Mid-, and Long-Term
Support the residential new construction market with technical support, training, and other assistance to achieve ZNE by 2020	Mod	1, 2	Near
Cross-Cutting Sectors:			
Residential, Commercial, and Public			
Partners:[318]			
• Other programs within the EE portfolio • Other internal groups outside EE portfolio: distribution, transmission, DG, EVs, DR, storage, etc. • Agencies and code-setting entities: CPUC, CEC, CARB, DOE, ASHRAE, ICC • Municipal utilities and organizations: SMUD, Los Angeles Department of Water & Power (LADWP), Southern California Public Power Authority (SCPPA), Northern California Power Agency (NCPA) • External progressive utilities and other entities: NEEA, National Grid, Arizona Public Service, West Coast Collaborative, etc. • Water agencies • Residential single-family and multi-family home builders			

b) State Building Codes Advocacy Subprogram

Refer to PG&E's business plan for more detail.

c) State Appliance Standards Advocacy Subprogram

Refer to PG&E's business plan for more detail.

[318] The C&S program team engages with many different stakeholders and partners. Thus, the "Partners" section within each subprogram table is non-exhaustive.

d) National and International Standards[319]

Background. Since 2005, the California IOUs have advocated for over 100 federal standards and test procedures, supported a number of changes to the 2007–2016 ASHRAE 90.1 Energy Standard for Buildings except Low-Rise Residential Buildings, and participated in other national and international code setting proceedings. The importance of Federal Appliance and Equipment Standards cannot be overstated because the number of product categories have grown to cover products representing about 90 percent of home energy use, 60 percent of commercial building energy use, and 30 percent of industrial energy use.[320] Hence, federal appliance standards are often the strongest policy tool for reducing energy use in existing buildings and a large part of achieving ZNE in both new and existing buildings. In addition to DOE appliance standards and test procedures, there are multiple national and international agencies or organizations that develop mandatory or voluntary standards, test procedures, labels, and/or protocols that could directly affect California customers and goals.[321] Table 60 describes the National and International Standards strategies and tactics.

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[319] Proposed new dedicated subprogram, separate from new formalized "statewide" programs. (In August 2016, CPUC D.16-08-019 directed the IOUs to implement the Building Codes Advocacy and Appliance Standards Advocacy subprograms under then new "statewide" basis. In response, we interpret the statewide building codes and appliance standards advocacy to include work in response to an open Title 24 or Title 20 docket established by the CEC to develop new building codes and appliance standards. The statewide team will continue to confer under the direction of the lead IOU, but this division allows for IOU-specific work in these areas.)

[320] DOE, accessed September 10, 2016, *available at* **https://energy.gov/sites/prod/files/2016/10/f33/Appliance%20and%20Equipment%20Standards%20Fact%20Sheet-101416.pdf** .Values are national estimates.

[321] These include, but are not limited to, American Society of Heating, Refrigerating, and Air Conditioning Engineers (model building codes, such as ASHRAE 90.1 and 189.1); International Code Council (model building codes, such as the International Energy Conservation Code and the International Green Construction Code); the EPA (Energy Star® labels); the Federal Trade Commission (EnergyGuide labels); Institute of Electrical and Electronics Engineers (e.g., IEEE 802.3 Energy Efficient Ethernet), International Electrotechnical Commission (test procedures); etc.

Table 60. National and International Standards Subprogram Strategies and Tactics

National and International Standards Subprogram Needs	C&S Objective	C&S Strategies
California codes and standards need to align with and reflect international as well as national standards.	1. The C&S program leverages the expertise of both national and international code-setting bodies in the development of California codes and standards.	NISA-1. Lead the highest quality advocacy that resources allow to maximize impact from national and international codes and standards setting bodies that affect California customers and goals (for example, DOE, ASHRAE, ICC, EPA, USGBC, CHPS, IEC, etc.)
		NISA-2. Support significant increases in the scope and stringency of national regulations and standards that support California's policy goals.

Tactics	New, Existing or Modified Tactic?	Near-, Mid- or Long-Term?	Strategies Addressed
Influence code development proceedings (for example, DOE, ASHRAE, ICC, etc.) that increase stringency, and expand scope of coverage.	Mod	Near	1, 2
Lead collaboration with national industry associations, labs, and EE/ DR advocates (NRDC, ACEEE, PNNL, DOE, EPA, Society of Automotive Engineers, ASAP, CEA, NEMA, etc.) to influence national building codes and appliance standards.	Mod	Mid	1, 2
Increase support for model codes (for example, ASHRAE 90.1 and IECC) reach codes (for example, ASHRAE 189.1, CALGreen) and rating systems (LEED, ResNet) to simplify and harmonize with national codes and ratings.	Mod	Near, Mid & Long-term	1
Support the Energy Commission interactions with federal agencies, where feasible and appropriate.	New	Mid	1, 2
Actively participate and influence the development and updating of test methods and ratings with industry groups (NEMA, AHRI, etc.), technical committees (ASHRAE, IES, IEEE, etc.) voluntary programs (DLC, CEE, EPA/ENERGY STAR, etc.), and regulatory agencies (DOE, ICC, etc.).	Mod	Near, Mid	1
Lead collaboration with federal agencies through improved data collection.	Mod	Mid	1, 2
Increase support for national and international standard setting processes through improved data, technical support, and advocacy.	Mod	Near	1, 2
Strengthen the advocacy coalition with other advocacy groups and stakeholders outside California.	Mod	Near, Mid	1, 2

Partners:
• Codes and standards setting entities • Sectors: Commercial, Residential, Industrial, Public, Agriculture • IOU Internal Programs: Emerging Technologies Program, DR, Incentive Programs, Zero Net Energy Programs and Workforce Education & Training • IOU Statewide C&S Team • EE and DR advocates • Manufacturing community and Industry groups Construction & Design Community

e) Compliance Improvement

Background. The Compliance Improvement Subprogram assists with improving compliance for both the Building EE and CALGreen Standards (Title 24, Part 6 and Part 11), and California's Appliance Standards (Title 20). Compliance improvement activities complement advocacy work by enabling potential savings from C&S to be realized and persist over time. The Compliance Improvement subprogram targets market actors throughout the entire compliance supply chain by providing needs-based tools, training, resources and outreach. Table 61 describes the Compliance Improvement Subprogram strategies and tactics.

Table 61. Compliance Improvement Subprogram Strategies and Tactics

Compliance Improvement Subprogram Needs	C&S Objective	CS& Strategies
Code compliance requires market actors to have current technical knowledge about code implementation.	1. California market actors have the knowledge, tools, and materials needed to increase code compliance.	CI-1. Lead and develop a plan to improve and disseminate resources supporting compliance with building and appliance efficiency standards to help realize the full potential of adopted standards.
Code compliance needs to be implemented by market actors throughout the compliance supply chain.	2. Targeted California market actors understand their respective roles and responsibilities in code compliance	CI-2. Design and offer classes to support various market actors in the compliance supply chain to understand their unique roles and responsibilities in compliance, and equip each with the specific knowledge, skill, and tools they need to quickly, easily and effectively perform their compliance job tasks.
Code development sometimes occurs without addressing code implementation needs.	3. CASE studies identify code compliance barriers and include ways to address them	CI-3. Support the development of successful standards by helping CASE authors address code implementation during the code development (advocacy) process.
Code compliance needs to be tracked using a consistent framework across PAs	4. C&S stakeholders are able to track code updates and compliance.	CI-4. Lead monitoring and reporting using a consistent framework on compliance with building and appliance efficiency standards.

Tactics	New, Existing or Modified Tactic?	Near-, Mid-, or Long -Term?	Strategies Addressed?
Identify needs of the various market actors in the compliance supply chain and work with each actor group to identify, guide development of and test potential compliance improvement solutions	Existing	Near-, Mid-, and Long-Term	1, 2, 4
Develop tools to support the reduction of burdensome processes that present barriers to compliance	Mod	Near-, Mid-, and Long-Term	1, 2, 3, 4
Develop training that teaches market actors how to perform their unique compliance job tasks and deliver training using the appropriate modalities per market actor	Mod	Near-, Mid-, and Long-Term	1, 2
Create resources (job aides) that help market actors understand how and when to comply with California's building and appliance EE standards	Mod	Near-Term	1, 2
Support certification of energy analysts and help create demand for the use of Certified Energy Analysts on specific projects	Existing	Near-, Mid-, and Long-Term	2
Conduct outreach to increase awareness of the value of compliance with California's energy standards and the availability of tools, training and resources to support improved compliance	Mod	Near-, Mid-, and Long-Term	1, 4
Incorporate user-centered design methodologies during the code development process in collaboration with advocacy stakeholders	Mod	Near-Term	3
Collaborate with key agencies during the rulemaking process to develop outreach plans to support new building and appliance standards	Mod	Near-Term	2, 3
In collaboration with other stakeholders, support the development of compliance measurement and tracking methods to inform future code updates and compliance improvement activity planning	New	Mid- and Long-Term	4

Partners:

- Code-setting entities: CEC, HCD, BSC
- Sectors: Residential, Industrial, Commercial, Public, Cross Cutting
- Other state agencies
- Investor Owner Utilities: IOU Statewide C&S Team, Programs, WE&T, DR, Local Government Partnerships
- Utilities: POUs and water districts
- Code enforcement community
- Design, construction, energy consultant community members
- Manufacturing community representatives
- State and local governments
- SoCalREN
- Research community members
- California's higher education institutions
- Energy and sustainability non-profit organizations

f) Reach Codes Subprogram

Background. A "reach code" is a locally mandated code or alternative compliance path that is more aggressive than the California Building Efficiency Standards, resulting in buildings that achieve higher energy savings. In California, the unique authority given to cities and counties to adopt reach codes allows local jurisdictions to aggressively pursue the Commission goal of achieving ZNE for all new residential construction by 2020 and for all new nonresidential construction by 2030. Reach codes play an important role in ZNE by providing an opportunity to test advanced EE building practices with designers, building owners, plan examiners, field inspectors, and other development stakeholders. Furthermore, reach code measures work in tandem with utility EE program incentives designed to accelerate market acceptance and adoption of ZNE building energy practices.

Every local government must determine the type of reach code ordinance best suited for meeting its unique GHG reduction goals. Typically, this includes deciding whether to adopt "performance based"[322] CALGreen Energy Efficiency Tiers such as exceeding base code by 15 percent, mandate "prescriptive"[323] measures such as cool roofs, and/or require "renewable energy"[324] installation such as solar PV. State law requires that "local governmental agencies wishing to enforce locally adopted energy conservation standards" submit a study with supporting analysis to the CEC showing how the local government determined energy savings and cost effectiveness.[325]

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[322] CALGreen (Title 24 Part 11) identifies several voluntary Tiers requiring "performance-based" energy code compliance thresholds that exceed the Title 24 building energy efficiency standards by a certain percentage (e.g., 15%). The performance approach allows considerable flexibility in the way that designers and builders can customize the set of energy measures that are best suited to the project's needs and characteristics, provided the building energy performance meets or exceeds the minimum requirements.

[323] Prescriptive-based requires installing specific Title 24 building energy measure(s) such as cool roofs, lighting, hot water distribution systems, water efficiency, and/or commercial kitchen applications.

[324] Mandating installation of renewable energy measures does not necessarily require following California's Preferred Loading Order: energy efficiency, demand response, renewables, and distributed generation.

[325] Section 10-106 of the California Code of Regulations, Title 24, Part 1, Article 1.

The Reach Code Subprogram collaborates with the CEC and Local Government Partnership Program to identify and provide technical assistance to local jurisdictions interested in adopting Reach Codes. This includes preparing cost-effectiveness studies by Climate Zone, drafting model ordinance templates for regional consistency, and assisting with the reach code application process. Recently, local governments have become increasingly focused on reducing GHG emissions. Many local governments have requested technical support from the Reach Code Subprogram to provide cost-effectiveness studies for non-EE measures such as PV systems, EV infrastructure, energy storage, DR, and water saving measures. Table 62 describes the Reach Codes Subprogram strategies and tactics.

Table 62. Reach Codes Subprogram Strategies and Tactics

Reach Codes Subprogram Needs	C&S Objective	CS& Strategies
Reach code benefits need to be articulated according to the values of local governments.	1. Local governments can readily articulate to their constituents the benefits of reach codes in terms of their jurisdiction's own objectives.	1. Support local adoption of reach codes that target higher levels of EE and greenhouse reduction goals.
		2. Lead collaboration efforts with CEC, Local Government Partnership Program, and other stakeholders to expand beyond traditional EE performance-based reach codes to include existing buildings, renewables, EV infrastructure, energy storage, DR, and water saving measures.
		3. Support collaboration efforts with CEC, Local Government Partnership Program, and other stakeholders to increase awareness of the value of Reach Codes.
Codes and standards need to be implemented in a supportive market in order to achieve satisfactory compliance	CASE studies include data on market receptiveness	4. Lead strategic planning activities within the EE portfolio to identify "code readiness" priorities for the building and appliance code advocacy programs.

Tactics	New or Modified Tactic?	Strategy Addressed	Near-term = 1-2 yr. Mid-term = 3-6 yr. Long-term = 5-15 yr.
Lead development of tools in collaboration with local jurisdictions that can track, quantify and report reach code energy savings and GHG reduction.	Mod	1	Mid-term

Lead coordination with CEC and HCD staff to leverage Title 24 Part 11 CALGreen Voluntary Tiers as a primary source for reach code measures by preparing cost effectiveness studies that support the CALGreen Voluntary Tier rulemaking process.	Mod	1	Near-term
Support local initiatives to improve efficiency in existing buildings such as Home Energy Score (HES) upon resale or on a voluntary basis, Green Multiple Listing Service (Green MLS), and/or retrofit EE for multifamily.	New	2	Mid-term
Support collaboration efforts with CEC, regional energy networks, local government partnerships, regional public affairs, and other stakeholders to educate local elected officials and staff regarding the value of Reach Codes, the requirements for adoption of local Reach Codes and best practices, tools and resources available to help local implementation.	Mod	3	Near-term
Lead the integration of EE, renewables, EV infrastructure, energy storage, DR, and water saving measures as a comprehensive reach code "toolkit" of measures. Support standards for DR-enabled appliances Collaborate with the Energy Commission to develop compliance software rulesets to optimize operation of PV, storage, and other IDER components. Identify strategies for mitigating potentially adverse impacts on the local distribution grid (especially aged infrastructure areas) including tariffs, net energy metering, and interconnection regulation.	New	3	Long-term
Lead strategic planning activities with EE programs such as Savings By Design to develop program incentives and targeted program offerings promoting reach code measures to rapidly increase market adoption, and prepare these measure to transition into the Title 24 building energy code.	Mod	4	Mid-term
Partners:			
• Code-setting entities: CEC • Sectors: Public, Commercial, Residential • IOU Internal Programs: LGP Program • State and local governments • Code enforcement community • IOU Statewide C&S Team • SoCalREN			

7. Codes and Standards Budget

Table 63 shows SCE's planned budget for the Codes and Standards program for 2018-2025. More details about SCE's budgeting process are described in the Portfolio Summary chapter (Section III.F).

Table 63. SCE's C&S Proposed Budget for 2018-2025

Program Year	Administration ($000)	Marketing ($000)	Direct Implementation ($000)	Incentives ($000)	Total Sector Budget ($000)
2015[326]	$515	$276	$6,093	$-	$6,608
2016[327]	$471	$-	$5,192	$-	$5,663
2017[328]	$509	$-	$5,152	$-	$5,661
2018	$509	$-	$5,152	$-	$5,661
2019	$509	$-	$5,152	$-	$5,661
2020	$509	$-	$5,152	$-	$5,661
2021	$509	$-	$5,152	$-	$5,661
2022	$509	$-	$5,152	$-	$5,661
2023	$509	$-	$5,152	$-	$5,661
2024	$509	$-	$5,152	$-	$5,661
2025	$509	$-	$5,152	$-	$5,661

8. Metrics

The C&S Program has supported various statewide policy goals and intends to enhance its efforts with the expansion proposed in this plan that will enhance portfolio integration and support a broader range of long-term goals. Success will be measured, in part, by the feasibility of new or modified standards to be used as a tool in meeting ZNE objectives in practice. The C&S Program will also be measured by the success in improving compliance and supporting the creation of electronic infrastructure systems, such as databases and repositories that collect information that provides evidence of improved uptake of adopted standards.

[326] Actual expenditures.
[327] Actual operating budget.
[328] Proposed budget.

Table 64. Codes and Standards Metrics[329]

Desired Market Effects	Intervention Strategies	Market Effect Metrics	1–3 years	4–7 years	8–10 years
Problem Statement: The CPUC identified a need to coordinate C&S activities across the PA territories.					
1. EE program stakeholders are able to coordinate their approach to achieve state EE goals for code and ZNE adoption.	PC-1.Convene a forum where IOU energy efficiency portfolio programs can coordinate actions to prepare the market for future code and ZNE adoption.	# of coordination / planning meetings to prepare market for ZNE	One forum annually	One forum annually	One forum annually
2. State agency stakeholders are able to contribute to the development of a "plug and play" grid.	PC-2. Convene a forum where EE PAs, market actors, and C&S stakeholders can discuss standards for a "plug and play" grid.	# of coordination / planning meetings to discuss developing a "plug and play" grid	One forum annually	One forum annually	One forum annually
3. EE PAs have the information needed to design programs and incentives that anticipate upcoming code changes.	PC-3. Lead strategic planning activities with PAs to identify synergistic priorities between EE programs and the building and appliance code advocacy programs.	Milestone: Deliver a collaboratively prioritized list of recommendations for program design or incentives[330]	One set of recommendations, updated annually	Revise and update recommendations annually	Revise and update recommendations annually
Problem Statement: California codes and standards need to align with and reflect international as well as national standards.					
1. The C&S program leverages the expertise of both national and international code-setting bodies in the development of California codes and standards.	NISA-1. Lead the highest quality advocacy that resources allow to maximize impact from national and international codes and standards setting bodies that affect California customers and goals (for example, DOE, ASHRAE, ICC, EPA, USGBC, CHPS, IEC, etc.)	# of advocacy documents[331] that include data and guidance from either national or international code-setting bodies	10	15	10
	NISA-2. Support significant increases in the scope and stringency of national regulations and standards that support California's policy goals.	# of national and international standards with increased stringency due to C&S program efforts	1	2	2[332]

[329] The data source for all C&S metrics is program tracking data. The baseline for most metrics will come from 2018 program data.

[330] The baseline for this metrics is not yet determined.

[331] Such as CASE, comment letters, market studies, and laboratory test reports

[332] These targets may change if federal priorities change.

Desired Market Effects	Intervention Strategies	Market Effect Metrics	1–3 years	4–7 years	8–10 years
Problem Statement: Code compliance requires market actors to have current technical knowledge about code implementation.					
1. California market actors have the knowledge, tools and materials needed to increase code compliance.	CI-1. Lead and develop a plan to improve and disseminate resources supporting compliance with building and appliance efficiency standards to help realize the full potential of adopted standards.	Milestones achieved in the plan to develop tools and materials	100% of milestones achieved in each annual plan	100% of milestones achieved in each annual plan	100% of milestones achieved in each annual plan
Problem Statement: Code compliance needs to be implemented by market actors throughout the compliance supply chain.					
2. Targeted California market actors understand their respective roles and responsibilities in code compliance	CI-2. Design and offer classes to support various market actors in the compliance supply chain to understand their unique roles and responsibilities in compliance, and equip each with the specific knowledge, skill, and tools they need to quickly, easily and effectively perform their compliance job tasks.	# of Codes & Standards related classes offered	100 classes annually	100 classes annually	100 classes annually
Problem Statement: Code development sometimes occurs without addressing code implementation needs.					
3. CASE studies identify code compliance barriers and include ways to address them	CI-3. Support the development of successful standards by helping CASE authors address code implementation during the code development (advocacy) process.	% of submitted advocacy documents that include plan to address implementation barriers	50% of advocacy documents	75% of advocacy documents	100% of advocacy documents
Problem Statement: Code compliance needs to be tracked using a consistent framework across PAs					
4. C&S stakeholders are able to track code updates and compliance.	CI-4. Lead monitoring and reporting using a consistent framework on compliance with building and appliance efficiency standards.	% of codes using framework developed by C&S to track code updates and compliance	50% of codes	75% of codes	100% of codes
Problem Statement: LGs need to understand how reach codes can help them achieve GHG goals					

Desired Market Effects	Intervention Strategies	Market Effect Metrics	1–3 years	4–7 years	8–10 years
LGs understand how reach codes can help meet GHG goals, including CEC requirements and best practices for adoption of local reach codes.	R-1. Lead collaboration efforts with CEC, LGP Program, SoCalREN, and other stakeholders to support LG efforts to adopt reach codes that target higher levels of EE and GHG reduction goals.	# of LGs that participate in workshops regarding best practices for adoption and implementation of reach codes	50 cumulative	100 cumulative	125 cumulative
Problem Statement: LGs need to obtain customized, technical analyses of the cost effectiveness of potential reach codes					
LGs have access to a reach code "toolkit" that includes customized technical consultation and a variety of cost-effectiveness studies ranging from traditional EE performance-based reach codes (e.g. exceed baseline code by a certain percentage) to prescriptive, measure-based reach codes (such as radiant barriers and cool roofs).	R-2. Lead collaboration efforts with CEC, LGP Program, SoCalREN, and other stakeholders to expand beyond traditional EE performance-based reach codes.	# of LGs that receive customized technical consultation services and/or cost-effectiveness studies from the reach code "toolkit" that support meeting local GHG or energy goals.	25 cumulative	50 cumulative	75 cumulative

9. Coordination and Integration

The C&S Program partners with many different entities to collect data, complete market research, develop code change proposals, respond to concerns expressed by various stakeholders, participate in public processes, and to support successful implementation of the adopted requirements. The Planning and Coordination subprogram leads the effort to align C&S Program activities with internal and external stakeholders. This includes long-term planning and alignment with other programs within the IOUs, including Emerging Technologies (ET), Workforce Education & Training (WE&T), and EE Incentive Programs to inform and support each team's goals and avoid the duplication of efforts.

An important aspect of the planning and coordination of the statewide C&S program is maintaining the strength and effectiveness of the relationship across California's IOUs. Currently, PG&E is designated the overall statewide lead for C&S, which has allowed the flexibility for each IOU to contribute to the statewide program and to address their independent

needs. However, going forward, two subprograms have been designated as being treated separately within this model. State Building Codes Advocacy and State Appliance Standards Advocacy will function as statewide (under the new definition established by D.16-08-019) subprograms administered by a single PA. An IOU advisory group will support these two subprograms and provide guidance to the lead administrator. This program has been one of the most successful statewide programs over the past 15 years. Maintaining its success in light of the changes is critical for long term success. Refer to PG&E's C&S Business Plan chapter for more detailed explanations of the two advocacy subprograms.

10. EM&V Considerations

A comprehensive understanding of the Codes & Standard's progress and challenges will come from a combination of evaluation studies and metrics tracking short term achievements.

For the non-resource C&S subprograms, several baseline studies are already under consideration.[333] These studies are intended to provide baseline data against progress towards code compliance and to enable tracking of reach code development. It is important to note that while PAs can support code compliance and reach code development, other market actors must also play their part to move the market. For C&S' support of ZNE preparedness activities, ZNE baseline and evaluation methodology studies are under way that will identify existing market actor practices and market barriers that need to be addressed.[334]

The following EM&V studies supporting the Compliance Improvement subprogram have been funded to date:

1. Compliance Improvement Process Evaluation for the Utility Statewide Program and BayREN C&S;

[333] 2013-2016 EE Evaluation, Measurement and Verification Plan, *available at* http://www.energydataweb.com/cpuc/search.aspx

[334] Regulators may need to approve use of these methodologies to measure achievement of ZNE.

2. Assessment of Compliance Improvement for Previously Evaluated Codes & Standards and Barriers to Code Compliance; and
3. Process Evaluation for IOU C&S Trainings, Classes, and Tools

The following EM&V studies supporting ZNE Preparedness activities have been funded to date:

1. Residential ZNE New Construction Market Characterization (completed);
2. ZNE Evaluation Methodology Study, Phase II;
3. Miscellaneous Energy Loads (MEL) Study / Feasibility Study of MEL Usage, Forecasting, and Methodologies;
4. ZNE Compliance Options for DERs, Phase 1;
5. K-12 and Community College Retrofit Readiness Market Characterization Study; and
6. State Building Decision Maker Study.

The development and tracking of program metrics to gauge sub-program effectiveness is essential to continued improvement of program implementation efforts. To be most useful to PAs, metrics need to provide information in a timely manner to support decision-making that may take place on a monthly basis. Metrics also need to be inexpensive to track, so that benefits of collecting these data outweigh the costs.

Please refer to the PG&E Business Plan for a discussion of the EM&V activities that support the C&S State Building Codes Advocacy subprogram and the State Appliance Standards Advocacy subprograms.

C. Emerging Technologies Program

1. Market Characterization

a) Overview

The Emerging Technologies Program (ETP)[335] is a non-resource program designed to help California customer-funded EE programs meet the state's energy reduction needs by identifying cost-effective measures that deliver reliable energy savings. ETP supports the PAs by fulfilling three objectives:

1. Provide PAs a comprehensive set of suitable technology options for new measures.
2. Provide PAs actionable market information to inform program delivery.
3. Confirm that technology development partners understand what measures programs need.

2. Customer Landscape

ETP's primary stakeholder and target audience are the PAs rather than the consumer or technology end user.[336] ETP itself is not a customer-facing program. ETP supports the ambitious objectives in the California Strategic Plan and legislative initiatives by directly supporting EE programs, including the C&S program. As a non-resource program, ETP provides information to program managers and designers who decide which technologies to offer

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[335] In this document, the acronym "ET" refers to emerging technologies (or the emerging technology sector in general) or to the activities of an emerging technology workgroup within a single company. The acronym "ETP" refers to the statewide Emerging Technology Program, an organized, collaborative effort of ET workgroup stakeholders from each IOU. The ETP supports increased EE market demand and technology supply by contributing to the development, assessment, and deployment of new and under-utilized EE measures (that is, technologies, practices, and tools).

[336] This is verified in a recent evaluation of the ETCC website (the primary means by which ETP disseminates its reports): only 7 of 81 survey respondents said they were just ET consumers, while all others categorized themselves as EE professionals, ET developers, vendors, manufacturers and distributors. The evaluators concluded that ETP was successful in reaching its intended target audience. (PY2013-2014 Emerging Technology Program Targeted Effectiveness Study Report, ODC, 2015)

through incentive programs. These program managers also design market interventions to promote customer use of EE solutions. While ETP facilitates and supports market transformation, ETP relies on PAs to conduct market interventions or achieve market transformation.

ETP aims to meet three needs of the PAs. Table 65 breaks down these three needs and shows how they drive ETP's objectives and strategies.

Table 65: ETP's Objectives and Strategies

PA Needs	ETP Objective	ETP Strategies
Identify new measures	Provide PAs a comprehensive set of suitable technology options for new measures.	1. Develop and execute Technology Priority Maps (TPMs)
Understand how the market will respond to new measures	Provide PAs actionable market information to inform program delivery	2. Solicit and meet PA requests for additional market or customer research on emerging technology measures
Technologies suited for PAs' programs.	Confirm that technology development partners understand what measures PAs need.	3. Work with technology developers with products <1 year from commercialization, including new technology vendors, manufacturers, and entrepreneurs.
		4. Work with technology developers with products <5 years from commercialization, including CEC, universities and colleges

ETP can also help PAs address market barriers. PAs, along with market actors (e.g., retailers, distributors, contractors, etc.), are reluctant to embrace new technologies that require changes to existing business models.[337] These entities are balancing needs to identify and adopt new technologies, while also reducing costs and maintaining cost-effectiveness requirements. For example, PAs are required to have a cost-effective portfolio; although a new technology is available, an excess of new technologies in a PA portfolio may imbalance it such that the portfolio is not cost-effective. Another example is that a plumber making a service call might encourage a customer to purchase a less-efficient traditional water heater because the plumber is unfamiliar with the installation requirements for a more advanced, higher-efficiency

[337] Eto, Prahl, and Schlegel, A Scoping Study on Energy-Efficiency Market Transformation by California Utility DSM Programs, Project 2091T (July 1996), *available at* https://eaei.lbl.gov/sites/all/files/lbnl_-_39058.pdf

heat pump water heater or condensing water heater. ETP leverages the WE&T Program to help address this challenge by providing design input on courses that help train contractors on proper installation methods, thereby increasing the likelihood that the market will adopt the emerging technology or be ready for an upcoming change to codes and standards.

PAs need information about customer technology preferences to inform the design of measure offerings. ETP can help program managers by conducting customer research on specific emerging technologies. This upfront work will provide useful information and reduce information costs[338] that program managers would otherwise incur if they had to obtain information on their own, thereby supporting customer response to those technologies.[339]

3. ETP Vision, Trends, and Challenges

a) ETP Vision

ETP's vision is to anticipate the latest emerging technology trends in order to bring innovative, verified technologies to PAs. Tracking and being on the forefront of these trends is an important component ETP's efforts to support the achievement of California's ambitious energy savings and GHG reduction goals, in an environment in which EE avoided costs[340] have declined, placing great pressure on programs to stay cost-effective. Program implementers assume much of the portfolio risk that is inherent with offering any new or unproven technologies to customers, which can manifest in evaluation studies as low realization rates. By finding innovations and managing their risk to the portfolio through vetting by ETP, EE PAs can maximize their impacts and cost-effectiveness.

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[338] *Id*.

[339] Note that market characterization studies that include uncovering market barriers and describing supply chains are under the purview of EM&V. ETP does not conduct market segment characterization studies, but instead conducts limited customer research specific to a particular emerging technology.

[340] Avoided Costs 2016 Interim Update (Energy and Environmental Economics, 2016), pp. 41-44, *available at* http://www.energydataweb.com/cpucFiles/pdaDocs/1591/Avoided%20Cost%202016%20Update-OUT.pdf

b) Trends in Emerging Technologies

The latest trends in ET reflect an evolving marketplace where previously complex solutions have become technically feasible, where data is gathered and used in new ways, and where products go beyond simple "plug and play" gadgets and become complex, interrelated ecosystems. These trends include moves toward IDER; use of data analytics; growth of internet-connected measures; and delivery of holistic, systems-level solutions through bundled measures. Figure 31 describes the evolution of measures as a result of these trends. The trends are discussed further below.

IDER: One of the most far-reaching trends is ETP's increasing role in supporting other utility activities, such as DG, DR, and energy storage. In addition, a recent directive from the Commission to increase natural gas and electric reliability in winter provides new roles for ETP.[341] This new integration of activities offers utilities the potential to provide greater value to customers by moving to a model of DSM procurement that can address grid needs and gas system management in real time.

[341] Letter from Energy Division Director to SoCalGas dated September 13, 2016, Directing SoCalGas to File Winter Demand Response Programs for the Winter of 2016, *available at* http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/News_Room/9-13-016%20Letter%20from%20Energy%20Division%20to%20SCG%20on%20Winter%20Demand%20Response%20Programs.pdf

Figure 31. Multi-Pronged Building Solutions Diagram

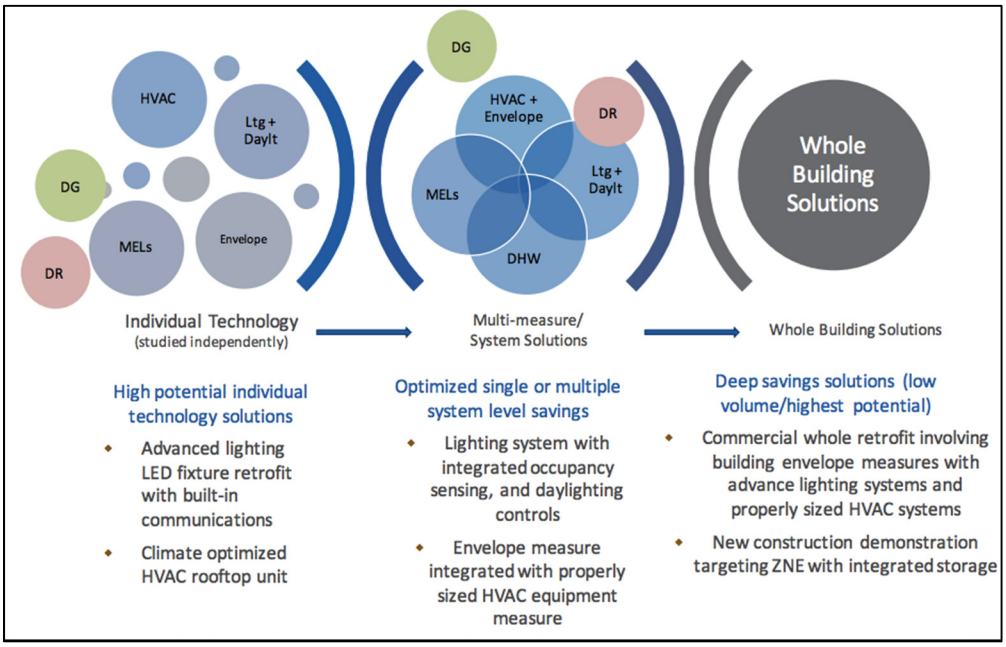

***Figure 31 Note*:** Over the years, the ETP has evaluated many individual technologies that save customers energy, including advanced lighting and HVAC products (left). Because repeatedly reaching customers with one-time EE measures can be difficult, the ETP also pursues integrated solutions that bring together several stand-alone technologies into a single package (center). Deeper savings can be realized by going beyond integrated systems to offer whole-building solutions (right). Treating a home or commercial building in a holistic manner can have additional customer benefits, such as added controls, increased comfort or making achieving energy goals easier.

Data analytics: There has been a proliferation of new data streams (e.g., energy usage via mobile apps and consumer "big data") coupled with new analytical tools such as Green Button Connect. Third-party vendors can develop new tools and services to potentially streamline and accelerate ET penetration, support M&V approaches, and enable the development of new behavioral programs. A host of new products in this area, such as EMS that intelligently optimize a building's operations in real time, are showing early success in targeting customers and delivering savings across sectors. EMS have become increasingly powerful in recent years with the proliferation of inexpensive building sensors, enhanced wireless communication capabilities, and increasingly intelligent automation and analytical functionality.

Internet-connected measures: As more devices are connected to the internet, aging hardware can now be upgraded with the latest features through a simple software update. This can have implications for both market adoption and savings potential. The

software development cycle is faster than for hardware, so the marketplace now evolves more rapidly. Because installing new software costs much less than upgrading hardware, this evolution could reduce adoption barriers by enabling product upgrades instead of replacements. Additionally, software patches can instantly convert an already-installed technology into a new product with different energy characteristics.

Bundled measures for holistic solutions: As PA EE portfolios have matured, many of the energy savings opportunities for individual products are no longer available. The technology trends described previously could enable a shift away from seeing technologies as standalone to thinking more holistically about multiple systems or entire buildings. By thinking about building systems holistically, it is possible to design spaces so that newly added components do not interfere with energy savings or other operational parameters of existing components. Taking a set of technologies that individually offer low savings potential and bundling them into one large package will allow utilities to tap into new savings opportunities where the whole is greater than the sum of its parts.

c) Challenges to ET Measure Development

In the technology development continuum,[342] ETP's contribution is during the technology assessment and validation stages, usually after the commercialization stage. ETP depends on technology developers and manufacturers to conduct research and development (R&D) and create new technologies and products for consideration in PAs' resource programs and/or codes and standards portfolio. After ETP recommendations are adopted as measures, ETP must rely on program implementers to design programs, set incentive levels, conduct marketing around new measures, and provide product information directly to the mass market. ETP's testing results are typically redacted to be name brand and model anonymous, without co-branding and endorsement, and designed to show the savings for the technology category. It is

[342] Benoît Godin, The Linear Model of Innovation, The Historical Construction of an Analytical Framework Vol 31, Issue 6, pp. 639 – 667, (Nov. 2006) *available at* http://journals.sagepub.com/doi/abs/10.1177/0162243906291865

important for stakeholders to understand ETP's role so that its achievements and boundaries can be recognized. In an environment where portfolio cost-effectiveness is increasingly harder to achieve, and every portfolio dollar must be carefully directed, ETP's ultimate role is to help PAs and program designers decide which technologies can meet California's energy needs.

There are two categories of challenges[343] to program adoption of emerging technologies: policy/regulatory and technical challenges. ETP is a stakeholder in forums addressing the technical challenges, and the PAs are exploring ways to bring about policy changes to allow greater innovation into the portfolio.

The following policy and regulatory issues make it more difficult for ETP to achieve its objectives:

- PAs are reluctant to offer emerging technologies when their impact on overall portfolio cost-effectiveness is uncertain. The emerging technologies team at Sacramento Municipal Utility District (SMUD)[344] and New York State Energy Research and Development Authority's Emerging Technology & Accelerated Commercialization (ETAC) program[345] have addressed this barrier by creating special exemptions for ETs from cost-effectiveness requirements.
- Policies are still evolving for behavioral interventions that would qualify for PA incentive programs. ETP can help inform policy makers by gathering data and developing tools to help measure impacts of behavioral interventions. In 2016, ETP developed a

[343] SCE uses the term market challenge instead of market barrier because "market barrier" usually refers to barriers facing end-use customers. ETP is not a customer-facing program.

[344] Evergreen Economics, Study of the California Utility Internal Measure Development Process, p. 6. (Aug. 2015), *available at* www.calmac.org/publications/SCE_Final_UIMD_ReportES.pdf

[345] Market Development: Addressing market barriers through scaled deployments and strategic supply chain intervention." Presented by Teddy Kisch, Energy Solutions at the March 22, 2016, ACEEE Market Transformation Symposium.

validated scale that can be used to measure the relative effectiveness of different behavioral interventions;[346]

- Current customer confidentiality regulations that limit third-party access to AMI data can slow digital innovation.[347] ETP can help by working with vendors that allow customers to access their own data while anonymizing customer data to the vendor;
- Different proceedings for EE, DR, and DG programs create funding silos that hinder coordination of IDSM projects and customer incentives. ETP can help by testing EMS that can accommodate EE, DR, and DG technology, in anticipation of potential policy changes to remove funding silos;
- The existing net energy metering (NEM) tariff can limit DG and combined heat and power (CHP) applications due to separate accounting treatments of renewable customer-generators;[348] and
- The lack of clarity around workpaper requirements means that the data for workpapers are sometimes not sufficient, necessitating a follow-up data collection effort. These workpaper data parameters are not made available to the PAs at the outset of a project. This challenge hampers ETP's ability to develop clear scopes of work with concrete deliverables that are needed to effectively solicit and manage third-

[346] Psychometric Testing of Scales for Assessing Behavioral Interventions in Demand Side Management Programs, *available at* http://etcc-ca.com/reports/dimensions-energy-behavior-psychometric-testing-scales-assessing-behavioral-interventions**.**

[347] These issues are currently being addressed by the CPUC Energy Data Access Committee*, available at* http://www.cpuc.ca.gov/General.aspx?id=10151.

[348] Under the existing NEM framework, customers receive credits at the full retail price per kWh exported as described in [Public Utilities Code] Section 2827(h). This is a higher credit rate than other programs, such as the fuel cell NEM program (Section 2827.10) that only provide compensation at the interconnected IOU's generation rate. Section 2827(g) exempts [renewable] NEM facilities from the standby charges that many other categories of self-generation must pay. D.16-01-044, p. 14.

party implementers. This same lack of clarity also negatively affects the CEC-EPIC program, which has asked for a clear set of workpaper requirements so that their research may eventually be transferred to measures for programs.[349]

4. Value of ETP

To effectively support PAs, the ETP conducted over 300 technology evaluations and over two dozen demonstrations and showcases in the 2013–2015 program cycle.[350] These efforts have supported the development or enhancement of numerous new EE program measures, education programs, and codes and standards. Just as importantly, these efforts have filtered out technologies from programs due to a long payback periods or limited value to the portfolio, allowing program designers and implementers to direct limited resources to measures with reliable savings. This section describes how ETP provides benefits to customers, to market transformation initiatives, to regulatory and legislative initiatives, and to non-energy priorities. ETP's support of cross-cutting programs such as WE&T and C&S will be described in a later section. Appendix J provides a summary of ETP's accomplishments.

a) Benefits to Customers

Although ETP is not a customer-facing program, the ETP's work can affect customers indirectly. End-use customers can benefit through the reduction in time it takes viable new products to enter the marketplace due in part to ETP's validation that an emerging technology is suitable for a PA's program. Because PAs set incentives and design outreach, the ultimate adoption rate is largely influenced by the PA efforts.

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[349] CEC-EPIC staff question presented at the Staff Workshop Discussion on the Investor-Owned Utilities' Emerging Technology (ET) Programs and the California Energy Commission's Energy Efficiency Research Programs, December 8, 2016, Sacramento, *available at* http://www.energy.ca.gov/calendar/index.php?eID=2814

[350] IOU internal program records.

b) Support for Regulatory and Legislative Initiatives

Through ETP's direct support of the portfolio and codes and standards, the ETP also works to advance underlying state initiatives and policies, such as SB 350, AB 802, and AB 793. Chief among these is the CLTEESP, which describes such major long-term initiatives as transitioning the state's building inventory to ZNE and is accelerating the development and adoption of next-generation lighting and HVAC technologies.[351] Overall, 86 percent of ETP projects align with CLTEESP, according to an evaluation commissioned by the ED.[352]

In addition to the overarching CLTEESP, ETP is working to support several other state policies, including:

- SB 350, which seeks to double efficiency goals in the state's building stock by 2030. ETP sees integrated solutions as a key path towards doubling energy savings;
- AB 793, which seeks to enable smarter energy management through advanced technologies. ETP continues to assess data display and presentation solutions that can drive energy savings; and
- AB 802, which includes "to-code" improvements for underperforming buildings, facilitates enhanced access to building performance data, and paves the way to meter-based savings for customers. In some cases, meter-based savings can require extensive submetering, and ETP has begun to assess smart electric panels with built-in CT sensors for each breaker, and communicating compact gas meters that may someday provide inexpensive and accurate sub-metered data.

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[351] California Energy Efficiency Strategic Plan, January 2011 Update, §2.1.1, *available at* ww.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5303

[352] *Id*.

5. Beyond EE

With the rapid increase of both utility-scale renewables and behind-the-meter (BTM) [353] DERs on the grid, it is becoming increasingly challenging to manage the imbalance between power supply and demand in real-time, particularly because the balance can fluctuate within seconds. These fluctuations occur at both the system-wide level and at the neighborhood level (e.g., substation, transformer). ETP can play a role in helping to overcome such grid challenges by working in concert with programs and technologies on both sides of the meter to deliver resources capable of responding to grid needs.

ETP also performs important work on natural and alternative refrigerants. Older types of refrigerants found in appliances, air conditioners, and industrial equipment are harmful to the ozone layer and serve as a strong source of GHGs. The ETP supports the phase-out of these compounds by working to verify the viability and energy savings potential of new alternatives.

Another critical issue facing California is an ongoing drought that has strained water resources. Recognizing a link between water and energy (i.e., water-energy nexus), the ETP is working with utility agriculture stakeholders to find and accelerate adoption of energy-saving technologies that also deliver water savings.

The ETP also works to support the conversion of the transportation sector away from petroleum to electric and alternative fuel vehicles. The ETP has worked to understand the charging infrastructure for EVs, with the eventual goal of delivering effective energy management options through advanced controls that will facilitate time-of-need charging.

[353] "Behind the meter" refers to any activity, technology, or infrastructural elements that occur before electricity or gas enters a customer's home or business through the meter. This includes centralized generation and transmission, grid management, and utility storage.

6. ETP Strategies and Policy Recommendations

a) Strategies

The ETP is being modified to accommodate its redesign as a statewide program pursuant to D.16-08-019. The primary change will be the use of TPMs to strategically guide research. The ETP's objectives remain essentially the same, and are to address the three overarching PA needs identified in Table 65). This section provides more details about the strategies that ETP has chosen to meet those objectives and examples of past tactics. More details on the tactics will be provided in the Implementation Plans.

Objective 1: Provide PAs a comprehensive set of suitable technology options for new measures.

- *Strategy:* Develop and execute Technology Priority Maps (TPMs).
- *Metric*: Number of TPMs initiated; number of TPMs updated, and number of projects initiated.

To try to address all high priority areas,[354] the ETP's strategy is to use collaboratively-designed TPMs to drive the ETP research agenda. TPMs enable the PAs to have a comprehensive set of measure candidates. The IOUs already have technology roadmaps that align with both California policy priorities and their own customers' needs. By integrating each PA's existing technology roadmaps whenever possible, ETP can have a head start at developing TPMs that align with 1) California policy and 2) the needs of programs across the PAs. The TPMs may include projects addressing all stages of the technology product development lifecycle, including informing technology developers about desired specifications of new measures, conducting lab and field assessments, demonstrations, showcases, pilots, and market studies.

The strategy of using TPMs allows a modular approach to addressing policy priorities. TPMs can cover a broad priority area, for example all of Residential HVAC, or

[354] D.16-08-019, p. 63, Footnote 23.

targeted to delve deeply into a particular application within a particular sector, such as fault detection and diagnostics for public schools. In the near term, ETP plans to develop TPMs to address two priorities. ETP will dedicate one TPM to identifying which technologies hold the most promise for market transformation programs. This may include an assessment of market achievable potential for the highest ranking technologies, a market characterization that identifies key market actors and key market barriers, and a plan for moving forward in developing an appropriate market transformation program. ETP will also dedicate one TPM to high-risk technologies, with the stipulation that this can only be done if this TPM is exempt from cost-effectiveness calculations.

The TPMs will also be designed to be able to respond to changes in priorities or newly-defined needs, such as additional market research. The TPMs will be reviewed annually and, if needed, refreshed in order to stay current with technological advances. This may require that some projects be cancelled prior to completion if all stakeholders agree that a particular technology is no longer a priority.

Objective 2: Provide PAs actionable market information to inform program design.

- *Strategy:* Solicit and meet PA requests for additional market or customer studies on emerging technology measures.
- *Metric:* Percent of TPMs that include delivering actionable information for program designers.

ETP will help PAs understand how the market will respond to new measures, and thus reduce portfolio risk. ETP will achieve this objective by conducting projects and pilots that seek to probe the market's response to the emerging technologies. For the rolling portfolio, ETP will refine that strategy to directly meet specific requests from PAs for more market information to inform program design. This allows ETP to redirect resources from areas where PAs may already have market information (such as from their separate market research department) to areas that need such information. In the past, ETP has used demonstrations,

scaled field placements, and showcases as opportunities to gather data from customers on their interest in purchasing similar emerging technologies. ETP has also conducted pilots and technology introduction projects designed to simultaneously seed and gauge market interest in a new product while gathering more in situ data on energy savings.

ETP will measure progress towards this objective by documenting the percentage of TPMs that are designed to deliver actionable information to PAs.

Objective 3: Confirm that technology development partners understand what measures programs need**.**

- *Strategy 1:* Work with technology developers with products less than one year from commercialization.
- *Strategy 2:* Work with technology developers with products less than five years from commercialization.
- *Metric:* Number of outreach events.

ETP has chosen the strategy of working with technology developers during early product development stages (less than five years to commercialization) in order to provide early information about the needs of California customers and perhaps be able to suggest product specifications to the developers. ETP defines risk objectively, in terms of time-to-commercialization. Cultivating technologies that are in the inception and early R&D phases is high-risk because these technologies may not successfully make it to the market. Working with products that are closer to commercialization decreases that risk. ETP has been able to pursue high-risk/high-reward measures by working with technology developers during the early stages of the technology product lifecycle. ETP also works with later-stage products that are less than one year from commercialization, to find opportunities to support field testing. These two strategies allow ETP to maintain long-term relationships and communications with major manufacturers and encourage future product development at a relatively low cost. ETP has found success in the past through TRIO (Technology Resource Innovation Outreach) events held

in each PA service area, as well as a biannual Emerging Technologies Summit, rotating through locations in each PA's service territory.

ETP's tactics are used to support multiple strategies and are to be used in the near- mid- and, long-terms. Table 66 lists the ETP's traditional tactics. New tactics may be added to the ETP Implementation Plans.

Table 66. ETP Traditional Tactics

Tactics	Existing, Modified, or New Tactic?	Objective Number(s) Addressed	Timeframe[355] (Near (N), Mid (M), or Long (L) term)
Conduct laboratory testing to evaluate performance uncertainties and/or other attributes potential effectiveness	Existing	1	N, M, L
Conduct paper studies to synthesize existing research and findings from multiple sources	Existing	1,2	N, M, L
Conduct scaled field placements of a number of measures at customer sites as a key step to gain market traction and gain market feedback	Existing	1,2,3	N, M, L
Conduct solicitations for third party projects to introduce emerging technologies to the market	Existing	1,2	N, M, L
Conduct demonstrations to seed market interest through proof-of-concept installations	Existing	1,2,3	N, M, L
Conduct demonstrations to allow hand-on interactions with solutions to gather customer data and feedback	Existing	1,2,3	N, M, L
Conduct market, customer, and behavioral studies targeted towards specific applications or sectors	Existing	1,2,3	N, M, L
Facilitating field evaluations at customer sites	Existing	1,2,3	N, M, L
Make lab testing facilities such as SCE's Technology Test Center (TTC) available to companies without appropriate testing capabilities	Existing	3	N, M, L
Develop standard testing protocols and facilitate widespread use of these protocols	Existing	3	N, M, L
Develop tools to facilitate assessment of emerging solutions, such as holistic solutions	Existing	1,3	N, M, L

[355] For ETP purposes, near-term is considered 1-2 years, mid-term is considered 3-4 years, and long-term is considered 5-15 years.

Fund college and university competitions on high-risk, high-reward technologies	Mod	3	N, M, L
Cultivate and maintain relationships with industry partners	Existing	3	N, M, L
Conduct outreach events to facilitate ability of entrepreneurs widen network of business contacts	Existing	3	N, M, L
Help technology developers learn utility business practices and procurement requirements	Existing	3	N, M, L

Table 67 provides additional details for the statewide Electric ETP program proposal, for which SCE is the proposed statewide lead.

Table 67. Statewide Electric ETP Program Details

Program Name: Emerging Technologies Program - Electric	
Program Description: The Emerging Technologies Program (ETP) is a non-resource program designed to help California ratepayer-funded EE programs meet the state's energy reduction needs by identifying cost-effective measures that deliver reliable energy savings.	
Program Objectives: • Use Technology Priority Maps (TPMs) to focus on high-priority areas. To do this, the ETP will use collaboratively designed TPMs to drive the ETP research agenda during the time period covered in this business plan. ETP will use existing technology road mapping efforts whenever possible to create TPMs to align with California policy and customer needs. These TPMs will seek to identify good candidates for all utility programs including market transformation initiatives (such as C&S) • Support a pipeline with a consistent stream of new and diverse technologies. The ETP projects will be designed to encourage manufacturers and technology developers to create technologies that help PAs achieve their EE goals • Reduce risk for unverifiable savings in utility programs. The ETP technology assessment projects will also be designed to validate that the technologies and solutions the PAs offer will have verifiable energy savings. This is accomplished in part by early vetting of technologies and solutions that are candidates for inclusion into an EE portfolio. These assessment activities are designed to help PMs create measures that have a more robust level of assured savings	**Potential Metrics**: The ETP metrics are discussed in Section IX.C.8 below.
Solicitation Strategy: ETP will seek multiple program implementers to deliver innovative, effective program designs. ETP will look for program designs that support the stated ETP objectives and strategies.	**Transition Timeline:** The program will meet the obligation for 2017 program implementation under current program design and any activities that extend

The solicitation strategy will be linked to the TPMs that will be undertaken as part of the early planning efforts once the business plans have been approved. The solicitation approach will incorporate the business plan strategies for all segments, fuel-type (gas or electric) unique needs, market transformation objectives, program portfolio needs, and locational / regional needs.	into 2018. PAs may need to maintain certain infrastructure to support these activities. For the new program design, TPM development will begin in 2017 following Commission approval of the business plan. In 2018, the program will focus on development of Implementation Plans, TPMs, and other strategic planning activities. Full implementation of the new program design will occur in 2018.

b) Policy Recommendations

As EE cost-effectiveness becomes more difficult to achieve, it becomes more important to make new technologies available to the market in meeting California's energy savings and clean energy policy goals. To address this challenge, the IOU PAs recommend that for a five-year period, measures that have undergone an ET assessment should have their costs excluded from TRC calculations. An incentive adder or "kicker" could be provided for specific measures to bridge the gap between introduction of s new ET offering and market adoption. Similar provisions have been successful at SMUD[356] and NYSERDA's ETAC (Emerging Technology & Accelerated Commercialization program).[357]

One key benefit of statewide administration of ETP will be the ability to roll out new ET measures across the state at the same time. This benefit cannot be realized until there is a consistent approach for the viable introduction of ET-assessed measures into mainstream incentive programs. The IOU PA proposal described above will enable all utilities to handle ET measures in the same manner and timeline and adhere to a consistent decision-making and introduction process. In addition to establishing a consistent statewide approach, exempting ET measures from TRC for five years will allow each utility to continue gathering data on ET savings and market interest. This time period will permit utilities to confirm estimates of market potential that would affect penetration rates. Data from participating

[356] Evergreen Economics, Study of the California Utility Internal Measure Development Process, p. 6. (Aug. 2015), *available at* www.calmac.org/publications/SCE_Final_UIMD_ReportES.pdf

[357] Market Development: Addressing market barriers through scaled deployments and strategic supply chain intervention." Presented by Teddy Kisch, Energy Solutions at the March 22, 2016, ACEEE Market Transformation Symposium.

customers will be critical for understanding realization rates and the specific NTG associated with the ET. The statewide ETP will be able to develop a robust estimate of the impact of ET measures on portfolio cost-effectiveness. Ultimately, this proposal will add consistency across the state and allow utilities to make better informed decisions at the end of the five-year period. As such, it will increase the likelihood that high potential ET measures will succeed in the market and help to meet state energy savings goals and policy goals related to market transformation, ZNE, and grid integration.

7. Emerging Technologies Budget

Table 68 shows SCE's planned budget for the Emerging Technologies program for 2018-2025. More details about SCE's budgeting process are described in the Portfolio Summary chapter (Section III.F).

Table 68. SCE's Emerging Technologies Proposed Budget for 2018-2025

Program Year	Administration ($000)	Marketing ($000)	Direct Implementation ($000)	Incentives ($000)	Total Sector Budget ($000)
2015[358]	$715	$8	$7,342	$40	$8,105
2016[359]	$530	$100	$6,402	$446	$7,478
2017[360]	$488	$103	$6,886	$-	$7,476
2018	$488	$103	$6,886	$-	$7,476
2019	$502	$106	$7,092	$-	$7,701
2020	$512	$108	$7,234	$-	$7,855
2021	$502	$106	$7,090	$-	$7,698
2022	$517	$109	$7,302	$-	$7,928
2023	$533	$113	$7,521	$-	$8,166
2024	$549	$116	$7,747	$-	$8,411
2025	$565	$119	$7,979	$-	$8,664

8. Metrics

ETP metrics are a challenge and face many of the well-known difficulties in measuring performance that all technology programs suffer.[361] (See Appendix K). However, over time and through discussion with evaluators and stakeholders, ETP has learned that a distinction needs to be made between metrics that track progress towards ETP's quantitative objectives and targets, which are within ETP's control, versus metrics that track variables of interest to stakeholders, but are outside of ETP's control.

To apply these lessons learned, ETP metrics that are directly associated with ETP's objectives and strategies, within the Joint Utilities Metrics Framework.[362] [363] These "goal metrics" allow stakeholders to track ETP progress towards quantitative objectives for the aspects

[358] Actual expenditures.

[359] Actual operating budget.

[360] Proposed budget.

[361] Measuring Performance: Strengths and Limitations of Research Indicators, US General Accounting Office (March 1997), *available at* http://govinfo.library.unt.edu/npr/library/gao/rced9791.pdf.

[362] California Energy Efficiency Coordinating Committee Business Plan Guidance-Metrics Framework, *available at* http://www.caeecc.org/metrics.

[363] Because ETP is non-resource and is the only PA program that does not intervene in the market, "Problem Statement" was changed to "PA Needs," "Desired Market Effects" was changed to "Desired Outcomes/Objectives", "Intervention Strategies" was changed to "ETP Strategies", and "Market Effect Metrics" was changed to "Metrics."

of program performance over which ETP has control. The ETP metrics framework in Table 69 shows ETP's objectives, strategies, and metrics associated with the objectives ("goal metrics"). The data source for all metrics will be program tracking data.

Table 68. ETP Metrics Framework

Desired Outcomes/ Objectives	ETP Strategies	Metrics	Short Term Target (1-3 years)	Mid Term Target (4 – 7 years)	Long Term Targets (8-10+ years)
Programs have a comprehensive set of suitable technology options for new measures.	Strategy 1: Develop and execute Technology Priority Maps (TPMs)	Number of TPMs initiated Number of TPMs updated[364] ---- Number of projects initiated[365]	6 TPMs initiated (including 1 TPM on MT and 1 TPM on high-risk tech, subject to CE exemption) 3 TPMs updated ---- ~TBD[366] Projects Initiated	3 TPMs initiated 3 TPMs updated ---- ~TBD Projects Initiated	3 TPMs initiated 3 TPMs updated ---- ~TBD Projects Initiated
PAs receive actionable market information to inform program design	Strategy 2: Solicit and meet PA requests for additional market or customer research on emerging technology measures	% of TPMs that deliver actionable market information[367]	100%	100%	100%
Technology development partners understand what measures PAs need.	Strategy 3: Work with technology developers with products <1 year from commercialization, including new technology vendors,	Number of outreach events[368]	15 outreach events	20 outreach events	15 outreach events

[364] The baseline for this metric is TPM statistics in 2018.

[365] The baseline for this metric is number of projects in the 2013-2014 program database.

[366] This number will be provided once better data is available.

[367] The baseline for this metric is TPM statistics in 2018.

[368] The baseline for this metric will be the number of outreach events recorded in PY 2018 Program Tracking Data.

	manufacturers, and entrepreneurs.				
	Strategy 4: Work with technology developers with products <5 years from commercialization, including CEC, universities and colleges	Number of outreach events[369]	6 outreach events	8 outreach events	6 outreach events

In addition to the metrics above, ETP also proposes to track those outcomes that are outside of ETP's control, but still provide useful information for understanding ETP's value and for tracking long-term trends in technologies that may inform future TPMs. Refer to Appendix K for more details about these tracking metrics.

9. Coordination with Other Programs

a) ETP Support of Market Transformation

D.16-08-019 requires statewide programs to be designed to achieve market transformation.[370] Because ETP does not intervene in the market, it must rely on PAs to carry out market transformation programs. However, ETP can provide critical support to programs that focus on market transformation initiatives. ETP will develop an implementation plan to identify measures that would be suitable for market transformation programs (see discussion of TPMs in Section C.6.a of this chapter). ETP is ideally suited to support market transformation in four specific ways:

1. Working with technology developers and manufacturers to design specifications for new products.
2. Supporting technology introduction son a small scale to gather critical data to inform program designers about a technology's market viability.

[369] *Id.*
[370] D.16-08-019, p. 62.

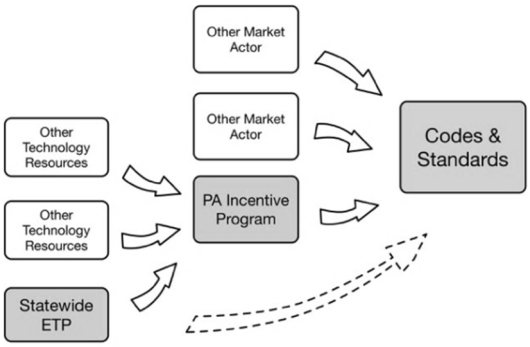
3. Collaborating on studies with the C&S program so that technologies can be adopted into codes and standards. ETP is a long-standing partner to the C&S program in their efforts to gather data for Codes and Standards Enhancement (CASE) reports.
4. Continuing to support the building industry market actors in designing and constructing ZNE new and existing buildings.

b) <u>ETP and the Codes & Standards Program</u>

The ETP has a history of close collaboration with the C&S program. This collaboration can help advance mutual goals, such as understanding motivations and barriers among home buyers and builders in order to meet ZNE policy goals, which will continue to be a key area of research (see Section IX.B.4 and IX.B.5) for more information about the C&S Program's ZNE efforts).

An ETP technology assessment can be the first step in initiating market transformation for efficient technologies, which can eventually end up with the higher efficiency technologies becoming a codified baseline. Figure 32 shows that PA incentive programs can draw from many sources, including ETP, for new measure ideas. Likewise, the C&S Program can draw from multiple sources for new potential codes, with PA incentive programs being one source. In some cases, C&S can bypass the process of vetting the technology in the market, which accelerates code development but may increase the risk that the technology is not viable in the market.

Figure 32: Programs Use Multiple Sources of Ideas for New Measures; C&S Uses Multiple Sources of Ideas for New Codes.



Additional collaborative efforts between ETP and C&S include:

- Joint memberships in organizations such as the ASHRAE, which brings together ET experts; leaders from the HVAC industry; and C&S specialists to advance new equipment, building, and testing standards.
- Seeking out and evaluating emerging "code-ready" and ZNE-preparedness technologies that present such rapid adoption potential that they can become baseline much sooner than most other technologies. Because these efforts affect both programs, they work closely to share data and ideas for achieving maximum internal efficiencies and streamlining the adoption process. Because code-ready technologies vary in their impacts and applicability, each assessment has to be handled uniquely.

c) <u>ETP and the WE&T Program</u>

There is significant collaboration between the ETP and WE&T Program. The ETP shares data, identifies barriers, and provides technical information to supplement WE&T outreach and education efforts.

The collaboration between ETP and WE&T also includes helping raise awareness and advance understanding of California's ZNE efforts. As utilities turn to more integrated and whole-building EE solutions, ETP and WE&T will collaborate by examining barriers to and drivers toward adopting integrated solutions. The information gathered will be

useful for future education and training programs for homebuilders, commercial architects, facility operators, and trade allies.

d) ZNE

ETP provides core support to ZNE efforts and also collaborates closely with C&S on ZNE on projects. To prepare the market for upcoming ZNE-related code changes, ETP has worked closely with the building and design community to construct residential communities and retrofit commercial and public sector buildings that demonstrate value to both the owners and occupants and the capabilities to reduce and dispatch electric loads in real-time to address grid constraints and needs. The results from those initial efforts have demonstrated the feasibility of achieving ZNE and the benefits to the grid, and reduce TDV of energy use while attracting the attention of the building and design community.

e) Other Programs

In the vision of IDSM, PAs can combine different types of BTM technologies into one incentive program for end customers. In such a scenario, EE technologies would combine on-site solar, battery storage, and/or traditional and new DR technologies. Such a system would provide the ability to dispatch certain loads (e.g., lighting, HVAC) and the battery systems for both the utility and the wholesale markets.

One way to align those efforts would be to place the IDSM-capable technologies into the ETP TPM and run joint technology assessments, scaled projects, and demonstration showcases together with the other BTM teams, when applicable. ETP will continue to coordinate with IDSM, including:

- Collaborating with DR and EM&T programs to identify and validate technologies that help customers reduce energy consumption during peak hours, such as EMS.
- Researching the potential of combined building EMS, storage, and solar and other DG for the small- and mid-sized commercial segment. This research not only validates energy savings, but may also help to

better understand how customers value of these combined systems and highlight potential barriers to adoption.

f) Locational / Preferred Resources

In the future, IDSM efforts could be targeted to specific physical locations on the grid, through efforts known as locational targeting of DSM. DSM locational targeting's greatest value is in allowing for the deferral of capital investments on the grid through targeted load reduction specifically at the place where grid investment is needed (e.g., substations, feeders, transformers, etc.). ETP can support the integration of EE with other DSM resources to meet locational needs on the grid. This can be achieved through joint pilots in targeted locations, as well as projects to determine which EE technologies are applicable based on load shapes, customer segments, and operational processes.

10. ETP's Key Collaborators

ETP collaborates with several stakeholders to coordinate and/or co-fund a wide variety of projects. The primary avenue for collaboration among ETP members is through the Emerging Technology Coordinating Committee (ETCC), which brings together member utilities (including their ET and ET-related departments), national and international ET groups, and technology stakeholders in order to provide a common framework for assessment, reporting, and program development. Through ETCC, ETP collaborates across the IOUs, SMUD, LADWP, and the CEC. These collaborations reduce duplication of efforts and can help achieve the "critical mass" that encourages developers and manufacturers to develop CA-appropriate technologies.

ETCC activities include a number of outreach components to enable ETP to work as transparently and effectively as possible. This includes quarterly meetings around the state that are aimed at particular customer segments (commercial, residential, industrial, agricultural, and integrated systems) with the goal of highlighting innovation in each sector. The ETCC also holds a major conference — the ET Summit — every two years that brings together over 500 ET stakeholders, including leading experts, product developers, entrepreneurs, regulators, investors,

delegates from government agencies, gas and electric utilities, and academia. Other ETCC events include symposia that educate third parties on doing business with utilities, Open Forums that serve as platforms for tech companies to introduce their products to utilities, and regular ETCC Advisory Council activities that bring North American utility and industry ET voices to the ETCC.

Though ETCC is the largest collaborative effort across the ETP, the constituent utilities are highly active in a number of additional consortia, initiatives, and groups identified in Table 70.

Table 69. ETP Collaborations

Category	Partners
ETCC Members	SCE, PG&E, SDG&E, SCG, CEC, SMUD, LADWP
Research entities	CEC • Electric Program Investment Charge (EPIC) • Public Interest Energy Research (PIER) programs UCD Center for Energy Efficiency • CA Lighting Technology Center • Western Cooling Efficiency Center Lawrence Berkeley National Laboratories Advanced Projects Agency – Energy (ARPA-E) U.S. Dept. of Energy (DOE)
Technology commercialization / entrepreneurship entities	Technology developers Technology financiers Clean tech accelerators DOE's First Look West Cleantech Open California Sustainable Energy Entrepreneur Development (CalSEED)
Strategic organizations	Consortium for Energy Efficiency (CEE) E Source New Buildings Institute (NBI) American Council for an Energy-Efficient Economy (ACEEE) California Institute of Technology (Caltech) Electric Power Research Institute (EPRI) Gas Technology Institute (GTI)
Technology adopters and ET demonstration hosts	Owners, tenants, property managers, third-party vendors (through the Technology Resource Innovation Program (TRIP)

11. EM&V Considerations

The ETP's efforts absorb many of the business risks associated with maintaining a highly-effective EE portfolio even if energy savings from ET measures only fully materialize years after the projects end. Therefore, ETP is successful in the short term if it both identifies potential new measures and filters out inappropriate technologies.

An impact evaluation intended for resource programs can be problematic when applied to non-resource programs, such as ET. The method of only counting technologies that are adopted into the measure portfolio discourages the calculated risk-taking upon which the ETP has built a credible, long-term track record and underrepresents the value of the program. Counting only adopted technologies sets faulty incentives for ETP to only focus on low-risk measures with high likelihood to become IOU program measures. ETP fulfills several functions for the EE portfolio, including identifying and supporting measures with high value for the portfolio, but also pursuing some "high-risk, high-reward" measures. ETP's program metrics need to track both adopted technologies and filtered technologies to accurately reflect ETP's value in preventing ineffective technologies from being offered by PMs.

While SCE supports tracking the impacts of ETP's work in terms of EE program outcomes, there are additional indicators that should be considered to accurately gauge ETP's success. Tracking the number of new measures recommended by ETP, as well as their market uptake, is informative for the portfolio as a whole, but neither the number of new measures nor their market uptake rate is under ETP's sphere of influence. ETP evaluations should also take into consideration nationwide trends and challenges, such as the difficulty in finding cost-effective measures for the Residential sector, which is not a problem specific to California.

To track these additional indicators the utilities are currently updating the ETP tracking database to include data on both factors under ETP control and factors not under ETP control. See Appendix K for a list of factors not under ETP's control. The ETP database will be designed to track information that can be gathered during the course of program implementation. These indicators will meet ETP's evaluation needs in the short term.

ETP's evaluation needs in the longer term require significant development of additional infrastructure to track coordination and optimization according to the TPMs, as well as projects that have a limited timeframe in which savings can be realized and may not be on the TPM. Evaluation preparedness will be discussed in detail in the Implementation Plans. At the sector level, ETP should be considered a success if it meets its three objectives (described in Section IX.C.2). Process evaluations of ETP will be the most informative if they consider what ETP can and cannot control.

D. Workforce Education and Training (WE&T)

1. Market Characterization

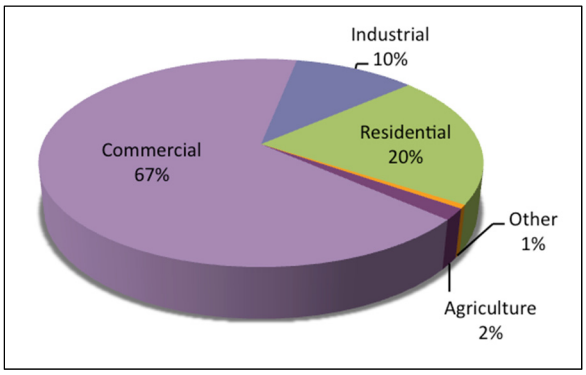
a) Overview

WE&T is a cross-cutting program that delivers educational offerings, tools, and other resources in an effort to equip the California EE workforce with the knowledge to recognize EE opportunities, and the skills to act upon those opportunities. WE&T provides education and training for current and future workers to perform the work needed to support California's clean energy goals.

b) Customer Landscape

The Statewide WE&T program addresses two primary audience types: (1) Customers and in-house staff/decision makers (e.g, building owners / homeowners, facility managers, business owners, developers), and (2) market participants that influence and serve customers (e.g., designers / architects, contractors / builders, engineers, educators, future market participants (i.e., students, workforce)). These audiences have different needs and requirements depending on the sector(s) in which they are engaged. As shown in Figure 33, WE&T provides the highest concentration of services, 65 percent, to the Commercial sector, with 20 percent for the Residential sector and 10 percent for the Industrial sector.

Figure 33. Energy Education Center Offerings by Sector



A wide range of classes are offered for these audiences with 25 percent in Building Performance, 22 percent in HVAC, 13 percent in Codes and Standards and 10 percent in Lighting.[371] Figure 34 shows the breakdown of class types at SCE's Energy Education Centers.

Figure 34. Energy Education Center Classes by Type

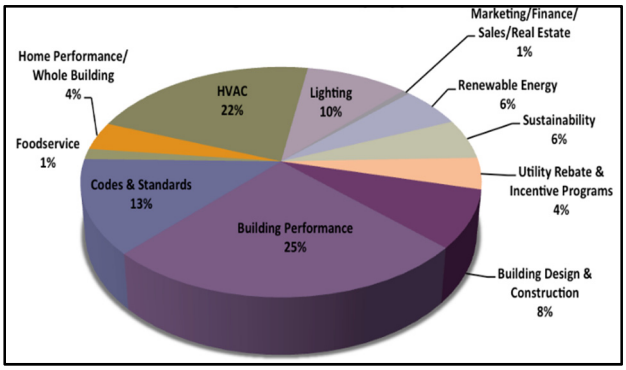


Figure 35 provides an estimate of the percent of industry actors that WE&T reached based on a 2010 Opinion Dynamics Indirect Impact Evaluation for statewide WE&T programs.[372] In certain industries, such as HVAC, engineering and architectural design, and government regulators, the WE&T program has reached over 20 percent of the market. In

[371] Statewide IOU WE&T Program, energy training centers student registration and participation from SCE internal databases 2013-2015.

[372] Opinion Dynamics, Indirect Impact Evaluation of the Statewide Energy Efficiency Education and Training Program, *available at* http://www.calmac.org/publications/06-08_Statewide_Education_and_Training_Impact_Eval_Vol_I_FINAL.pdf.

other areas, such as facility operators and maintenance or construction, for example, only two percent and six percent, respectively, were reached. While this information has value in helping to identify historic gaps and successes, it is important to establish the appropriate level of education required, and how much knowledge was acquired, rather than focus on the number of people reached.

Figure 35. WE&T Program Reach[373]

Industry Area	Market Actors (Statewide)	Estimated Reach by Centers	Percent Reached (Statewide)
HVAC and Refrigeration	19,700	9,427	44%
Government Agency/Regulatory/Inspector	12,500	3,263	26%
Engineering/Architectural Design	58,200	13,053	22%
Lighting	68,300	8,339	12%
Construction	161,200	9,064	6%
Boilers/Water Heating Sales	56,000	3,263	6%
Other	55,800	2,901	5%
Motors	49,400	2,538	5%
Facility Operations and Maintenance	163,000	3,263	2%
Energy Technology Research/Consulting	N/A	5,801	N/A
Pumping/Hydraulic Equipment	N/A	2,175	N/A
Renewables	N/A	5,076	N/A
Don't Know/Refused	N/A	2,175	N/A

c) Trends

Secondary, post-secondary, and adult continuing education providers, along with other training providers working within the building trades, are recognizing the importance of integrating EE concepts and best practices into their professional and applied skills training curriculum. Specifically, two-year colleges and other trades training schools are identifying high-potential areas of focus that include high performing building operators, skilled

[373] Donald Vial Center on Employment in the Green Economy, California Workforce Education and Training Needs Assessment for Energy Efficiency, Distributed Generation, and Demand Response, p. 191 (2011).

residential and commercial HVAC system designers, installers and maintainers, designers and installers of process automation and controls technologies, facility managers, and EE building systems and technology integrators.[374] In response, IOU WE&T programs have begun to collaborate with these training providers, infusing existing curriculum with key EE concepts and best practices and providing train-the-trainer sessions to help improve the knowledge and skills of faculty and industry experts.

As these trends evolve, the IOUs will continue to seek opportunities for alignment and integration of EE education into relevant apprenticeship and pre-apprenticeship programs; secondary career technical education (CTE) and Science, Technology, Engineering and Mathematic (STEM) programs; and 2-year college certificate and degree programs that seek to close skills gaps in energy-related occupations at an earlier level than with the incumbent workforce.

In addition, many EE market trends experienced throughout the EE portfolio inform WE&T activity and interventions to overcome a number of participation barriers. SCE's EE Portfolio identified some key opportunities where WE&T can help to achieve energy savings goals and overcome barriers to participation. These new and expanding market areas are intended to enhance SCE's portfolio of offerings, and include:

- Continuation and development of enhanced work quality improvement training for HVAC contractors participating in EE programs;
- Continuation and development of enhanced pump training services for program participants;
- Developing and delivering technician and installer training that will support meter-based energy savings projects related to AB 802 implementation; and

[374] Donald Vial Center on Employment in the Green Economy, Workforce Issues and Energy Efficiency Programs: A Plan for California's Utilities (May 2014) *available a*t http://laborcenter.berkeley.edu/pdf/2014/WET-Plan-Executive-Summary14.pdf.

- Introduction of training needs for distributor community about more energy efficient products.

In addition to SCE's specific EE Portfolio WE&T needs, research has identified other key areas where IOU WE&T offerings can intervene and help overcome barriers to participation in EE program opportunities. These observations and opportunities include:

Commercial Lighting: There is great potential for energy savings through more efficient lighting and lighting control systems in California nonresidential buildings. Developing installers' skills specific to advanced lighting controls can help realize those potential savings.[375] Furthermore, research has determined that advanced lighting controls systems design, along with comprehensive manufacturer's training integration, is needed.[376]

Commercial and Residential HVAC: Research and stakeholder feedback indicate that the Heating, Ventilation, Air Conditioning and Refrigeration (HVACR) technician workforce has significant skill gaps related to performing standards-based Commercial Quality Installation and Maintenance, and that quality installation and maintenance should become the industry and market norm.[377] Additionally, common knowledge and skills gaps exist in the residential HVAC workforce include understanding the value proposition for EE, how different systems work together, and how to clearly communicate these concepts to customers. Additional commonly cited gaps include understanding customer needs and being able to bid, manage, and supervise work.[378]

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[375] ASWB Engineering & Opinion Dynamics, Final Report: Lighting Controls Training Assessment (Feb. 2016), *available at* http://www.energydataweb.com/cpucFiles/pdaDocs/1458/Lighting%20Controls%20Training%20Assessment%20Report_2016-02-29_Final.pdf.

[376] *Id.*

[377] EMI Consulting, California HVAC Contractor and Technician Behavior Study Phase II (Apr. 2015), *available at* http://www.performancealliance.org/Portals/4/Documents/HVAC%20Research/Contractor%20TechnicianBehaviorStudy-Phase2-EMIConsulting-2015-04.pdf.

[378] Opinion Dynamics, PY2013-2014 California Statewide Workforce Education and Training Program: Contractor Training Market Characterization (June 2016), *available at*

Commercial and Industrial Facilities Management: Building operators and facility managers function as the hub for HVACR activities at their site and stand out as the most engaged in activities that affect an individual building's performance.[379]

Public Sector Code Compliance Improvement and Reach Codes: As codes have increased in stringency, local governments and jurisdictions face challenges when enforcing the energy code and pursuing the adoption and implementation of reach codes that are more advanced than T24. As discussed in the Public Sector Section, local jurisdictions need help to better understand complicated code changes in order to improve code compliance and support reach codes.

Residential and Commercial Zero Net Energy: The California market is not currently ready to implement a ZNE mandate for all residential new construction.[380] Market actors and decision makers throughout the Residential Homes market value chain have unique drivers and barriers to adopting upcoming ZNE mandates.[381] Additionally, the Commercial Sector faces unique drivers and barriers to adopting upcoming ZNE mandates, as well as strategies to improve ZNE retrofits on existing commercial building stock.[382]

Residential and Commercial Whole Building Design and Construction: A majority of the Southern California EE employment landscape is primarily focused on designing and increasing EE in buildings. Utility WE&T offerings should align and

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http://www.calmac.org/publications/CPUC_WET_Contractor_Training_Market_Characterization_FINAL.docx.

[379] California Community Colleges Chancellors' Office, High-Performance Building Operations Professionals - Achieving Zero Net Energy (May 2014), *available at* https://www.gcccd.edu/sdic-regional-consortium/documents/consortium/sswg/HPBOP_Proposal_053114.docx.

[380] TRC Energy Services, Residential ZNE Market Characterization Report, TRC, 2015, *available at* http://www.calmac.org/publications/TRC_Res_ZNE_MC_Final_Report_CALMAC_PGE0351.01.pdf

[381] *Id*.

[382] Zero Net Energy Action Plan: Commercial Building Sector 2010-2012, Engage 360 (2011), *available at* ftp://ftp2.cpuc.ca.gov/PG&E20150130ResponseToA1312012Ruling/2010/09/SB_GT&S_0470101.pdf

target EE opportunity awareness and skills development in the Commercial and Residential whole building/integrated focus area.[383]

Agricultural Cross-Cutting: Examples of barriers to EE adoption in the Agricultural sector include the lack of awareness of EE opportunities and understanding of the value proposition of EE, methodologies and sensibilities span multiple generations, increasing resistance to change, emerging agricultural markets increased energy use without naturally occurring efficiency, and a varying array of financing and program options can be confusing.[384]

EE Sales Training: AB 758 goals state the need to focus on training contractors and other market actors to sell EE. Research shows that EE sales skills can increase efficiency project quality, and that over 80 percent of those implementing efficiency projects are also responsible for selling new opportunities.[385] [386]

The electric industry is going through a period of significant change including technological advances, policy changes, market characteristics, and customer expectations. These changes are requiring new types of WE&T program offerings that support the EE workforce. In addition to AB 758 leading to the *Existing Buildings Energy Efficiency Action Plan* that addressed WE&T activities and continues to be further refined over time, new legislative bills were recently enacted into law that further addresses the DSM workforce. For example:

- SB 350 tasks the CEC with adopting a responsible contractor policy to ensure that EE measures meet high quality performance standards and

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[383] Energy Employer Survey, Advanced Energy Economy Institute, 2014.

[384] Evergreen Economics, SDG&E Agricultural Sector Market Study (Mar. 2015), *available at* http://www.calmac.org/publications/SDG%26E_Agricultural_Sector_Market_Study_Final_Report_032615ES.pdf.

[385] Western HVAC Performance Alliance, Recommendations to Operationalize "Employer Support" for the HVAC Sector Strategy (July 2016), *available at* http://www.performancealliance.org/Portals/4/Documents/Work%20Product/Recommendations%20to%20Operationalize%20Empoyer%20Support.pdf.

[386] EMI Consulting, California HVAC Quality Installation/Quality Maintenance Customer Decision-Making Study (Apr. 2015), *available at* emiconsulting.com/assets/CDM-Report-2015-04-15-FINAL.pdf.

reduce energy savings lost due to poor quality workmanship. The bill also addresses workforce development and job training for residents in disadvantaged communities;

- AB 802 requires the IOUs to provide aggregated energy usage data to qualified multifamily buildings. The bill also authorizes the IOUs to provide incentives based on NMEC as a measure of savings;
- AB 793 requires the Commission to require electrical and gas corporations to develop a program to provide incentives to a residential and small / medium business customers to acquire energy management technology for use in the customer's premises; and
- SB 1414 requires the CEC, in consultation with the Contractors' State License Board, local building officials, and other stakeholders, to approve a plan that will promote statutory compliance with the installation of central AC and heat pumps. The bill also requires a customer or contractor to submit proof of permit closure in order to receive a central AC or heat pump IOU EE rebate, if applicable.

SCE is working with stakeholders and regulatory agencies to implement new WE&T activities necessary to implement this legislation. This includes addressing any responsible contractor policies that affect the EE portfolio; increasing workforce and development training opportunities for, and within, disadvantaged communities; providing new training on energy management technologies; and providing new training on the best ways to incorporate NMEC as a measure of savings for EE project development.

d) Gaps and Barriers

Figure 36 presents the overall sector breakdown of SCE's WE&T offerings and highlights the cross-cutting nature of the portfolio. Offerings that target the Commercial Sector represent the largest categorization at just over 55 percent. Of those offerings, over 20 percent provide training that applies to the Residential Sector as well (HVAC

Quality Installation technician training). Overall, 44 percent of SCE's WE&T portfolio is cross-cutting in nature. WE&T offerings that target Public Sector end-use customers, market actors and decision makers are grouped into Residential and Commercial Sector categories.[387]

Figure 36. Categorization of Offerings by Sector[388]

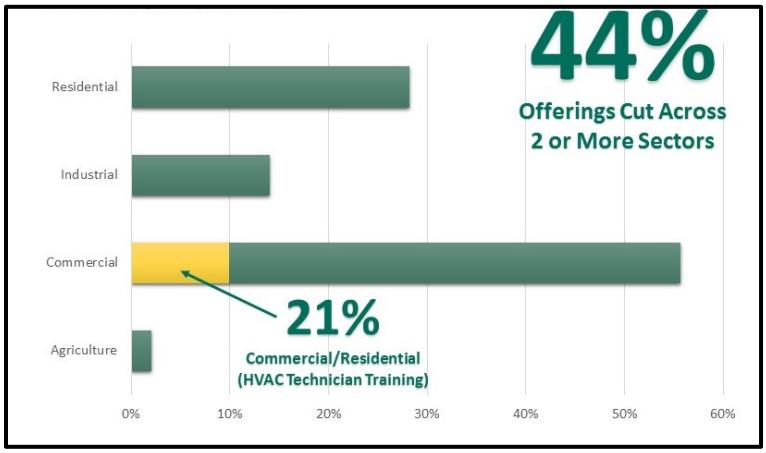
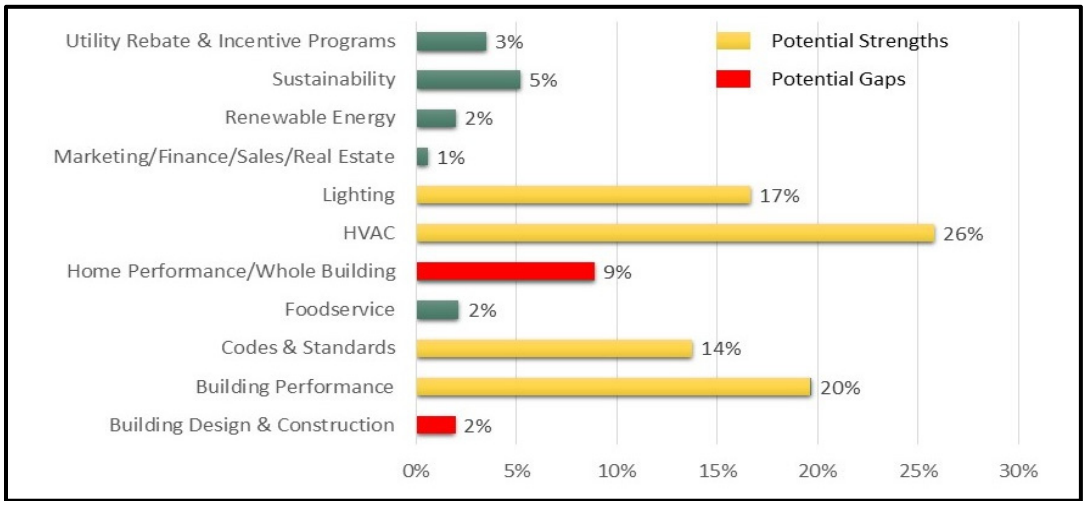


Figure 37 outlines the overall sub-sector breakdown of SCE's WE&T portfolio of offerings, with Lighting, HVAC, Codes & Standards, and Building Performance representing the largest categorizations. This figure also outlines some potential gaps in proportionate level of activity in the areas of Residential Home Performance/Whole Building, and Building Design & Construction.

[387] At the time of this analysis, SCE's WE&T participant database and offering categorization did not break out Public Sector classification.

[388] SCE's WE&T Program, energy training centers student registration and participation from SCE internal databases 2014-2015.

Figure 37. Categorization by Sub-Sector[389]



SCE continuously improves its WE&T program by addressing the most significant gaps in the current SCE WE&T portfolio of offerings as identified by program data collection and documentation. Historically, SCE's WE&T offerings indicated an unbalanced approach toward building design and construction and residential building performance curriculum with respect to the rest of the portfolio. Additionally, 20 percent of SCE's portfolio is focused on Commercial and Industrial building performance, yet nearly 70 percent of these offerings are focused solely on Industrial automation and controls. Other important areas of building operations, integrated whole building energy management, and facilities management needed additional focus.

Additionally, WE&T Program data and documentation indicated that SCE's WE&T Lighting training portfolio needed more emphasis on targeted, relevant offerings directed towards advanced lighting controls and integrated daylighting systems. As lighting systems are becoming more automated and complex, SCE needs to increase its ability to update and offer training that responds to the rapidly changing market needs.

WE&T Program data also identified the Agricultural Sector as an area of opportunity for new curriculum development and delivery. SCE has an Energy Education Center

[389] *Id.*

in Tulare, CA that is focused on the needs of the Agriculture sector, yet only three percent of SCE's portfolio focused on this high-potential sector. Thus, SCE must increase its WE&T activities in support of the Agriculture sector.

(1) Market Barriers for the WE&T Sector

Key stakeholders in the WE&T value chain face barriers to participating in EE educational offerings. These barriers affect program participants, PAs, and other core education providers consistently at the local, regional, and statewide levels. These barriers and challenges include:

- The WE&T landscape is complex and diverse, spanning a multitude of skill levels, end-use roles, high-potential markets, and delivery channels;
- EE is often a low priority among workers and other core education providers;[390]
- Key market actors and decision makers do not always understand the value proposition for EE;[391]
- Awareness of WE&T and EE opportunities is a significant barrier to participation in WE&T offerings;[392]
- California's energy code is complex and constantly changing;
- California's EE goals are aggressive and require substantial engagement by a diverse mix of stakeholder participants throughout the State; and
- Maintaining operational efficiency and effectiveness of WE&T is challenging in a complex and continuously evolving EE market.

[390] Opinion Dynamics, PY2013-2014 California Statewide Workforce Education and Training Program, Contractor Training Market Characterization, pp. 21-22 (June 2016).

[391] *Id.* at 8

[392] *Id.* at 7.

Specific SCE intervention strategies and tactics to address these challenges are detailed later in this business plan.

2. Value

WE&T was established to provide support for the State's EE goals and the CALTEESP. The CALTEESP vision for California's overall workforce education and training is: "By 2020, California's workforce is trained and fully engaged to provide the human capital necessary to achieve California's economic energy efficiency and demand-side management potential."[393] WE&T, as a cross-cutting program, is one element in a complex matrix of key stakeholders, collaborators, and other service providers that cannot solely address all EE market transformation efforts needed to support of California's aggressive energy savings goals.[394] SCE will continue to design its local program offerings in conjunction with relevant stakeholders to continue to deliver value as an important non-resource program supporting DSM programs. This includes continuing coordination with the many state programs and other sources of public funds already providing WE&T opportunities for the green workforce. Relevant stakeholders include: government, educational institutions, community-based and non-profit organizations, and industry and labor organizations.

3. Roles for WE&T Within the Cross-Cutting Sector

a) Support for the other Cross-Cutting Sectors

WE&T's target audience includes key market actors and decision makers throughout the EE value chain. WE&T offerings support the other Cross-Cutting Sector programs with subject matter expertise and technical assistance. WE&T also serves to inform market actors and customers about the Cross-Cutting Sector's programs and services. The

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[393] California Long Term Energy Efficiency Strategic Plan, Section 9, p. 74. California Public Utilities Commission (Sept. 2008, updated Jan. 2011).

[394] Donald Vial Center on Employment in the Green Economy, Workforce Issues and Energy Efficiency Programs: A Plan for California's Utilities (May 2014), *available a*t http://laborcenter.berkeley.edu/pdf/2014/WET-Plan-Executive-Summary14.pdf.

following sections describe how WE&T interacts with other Cross-Cutting programs within SCE's portfolio.

(1) C&S

WE&T will support the C&S Program with its education and training needs, particularly in the area of compliance improvement. SCE's WE&T offerings will inform market actors and decision makers across multiple sectors about upcoming code changes, the need for compliance, the value proposition of EE, and modeling software tools and resources.

(2) ETP

Through SCE's Energy Education Centers in Irwindale and Tulare, WE&T will continue to provide ETP with technical assistance and other resources to support the awareness and adoption of relevant emerging technologies. Where appropriate, WE&T will include information about ETP projects as part of educational programs and develop education and training programs specific to ETP activities. WE&T will also make its energy centers available for approved demonstrations, installations, and new product and program launch events, while integrating appropriate WE&T offerings.

(3) Finance

SCE's WE&T Program has historically offered courses to high-potential market actors and decision makers on how to make a business case for EE projects. Where appropriate, WE&T will integrate the Finance sub-sector's programs into relevant courses, particularly those targeted at customers and their building operator/maintenance staff, or in other sectors where gaps in awareness of available financing programs exist.

b) Support for the Portfolio

The WE&T program provides foundational support to the overall EE portfolio in several different capacities. These areas include:

- Ensuring the market is aware of EE programs opportunities;
- Educating program participants on key EE policy and code requirements;

- Increasing higher levels of workforce quality, knowledge and influence in support of EE savings throughout the portfolio;
- Providing WE&T support for changing, new and innovative, and high-potential EE program areas;
- Offering customer educational resource center benefits (new technologies, training market transformation benefits); and
- Enabling behavior change by creating advocates of smart energy management in both students entering the workforce and the general public.

c) Benefits to Customers

EM&V studies broadly indicate that end-use customers and high-potential EE market actors look to the WE&T Programs for relevant and timely training content, expertise, and related services. WE&T Programs provide the EE workforce with the knowledge to recognize EE opportunities and the skills and abilities to take action on those opportunities, ultimately resulting in energy savings that achieve EE goals.[395] Collaborations with other education providers increase EE penetration and allows for broader coverage and greater access to EE opportunities for customers. The end result is increased participation in EE.

d) External Impacts and Benefits

The WE&T program provides an excellent opportunity for workers to gain knowledge and develop skills that will support their participation in DSM program delivery. The development of a more skilled and knowledgeable workforce allows individual workers in their own communities to become better prepared for existing and emerging DSM opportunities. The WE&T program extends to all interested workers in the DSM space, including workers living in

[395] Opinion Dynamics, Indirect Impact Evaluation of the Statewide Energy Efficiency Education and Training Program, p. 2, *available at* http://www.calmac.org/publications/06-08_Statewide_Education_and_Training_Impact_Eval_Vol_I_FINAL.pdf.

low income and disadvantaged communities. The WE&T program also provides opportunities for local residents to become advocates in their own communities for smart energy management.

California needs a qualified workforce that can support California's energy policy goals. This includes the need to implement a responsible contractor policy for use across all EE programs that involve installation and/or maintenance by building contractors to ensure that retrofits meet high quality performance standards and reduce energy savings lost due to poor-quality workmanship.[396] In addressing this vision, SCE's WE&T program will support the EE programs by offering learning and development opportunities that will increase access to both new workforce entrants and long-time professionals. SCE envisions increasing partnerships with external workforce, education, and training entities to achieve the necessary level of expertise for the market enablers that support SCE's EE programs.

In support of EE programs, SCE has established the following WE&T goals:

1. Align, enhance, and deliver SCE's WE&T programs through key partnerships and collaborations to effectively address market needs.
2. In support of the State's aggressive long-term energy savings goals, equip the current and future California EE workforce with the knowledge and skills to help achieve EE program goals.
3. Design and deliver a WE&T program that continuously supports and improves the performance of SCE's EE Portfolio

To successfully achieve these goals, SCE proposes several new strategies in addition to the existing tactics. The 2018 program year will be used to better understand the impacts of these new and modified tasks on the program budget. SCE will adjust ongoing budget requests as necessary to deliver on the new and modified WE&T tactics identified in this business plan and subsequent WE&T program updates.

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[396] *See* Senate Bill 350 (2015).

4. **WE&T Vision and Opportunities**

a) Vision

During the next several years, SCE, in coordination, with the other IOU PAs will continue to support the CALTEESP vision for utility WE&T programs that "By 2020, California's workforce is trained and fully engaged to provide the human capital necessary to achieve California's economic energy efficiency and demand-side management potential."[397]

b) Cross-Cutting WE&T Program Offerings

WE&T program offerings span multiple sectors and customer end-uses. They are provided through a range of delivery methods including in-person workshops, demonstrations, evaluations, webinars, online and on-demand training, educational series and pathways to industry-recognized certification programs. Courses are offered in sub-sectors such as HVACR, Lighting and Controls, Codes & Standards, Building Performance, and SCE's Rebate & Incentive Programs. A variety of other educational offerings supplement the portfolio of workshops and seminars, such as building performance tool loans through the statewide Tool Lending Library, EE and emerging technologies equipment demonstrations, project consultations by industry subject matter experts, and on-site tours of SCE's Energy Education Centers in Irwindale and Tulare.

c) EE Workforce Opportunities

The WE&T Program promotes EE workforce opportunities across customer segments. WE&T also supports market penetration by disseminating information about efficient technologies and practices to electric, natural gas, and water utility customers and providing services to a variety of midstream and upstream market actors (e.g., architects, engineers, distributors, technicians, and contractors) who use information and tools to design more efficient buildings and processes, and to conduct efficient energy and water system retrofits

[397] California Long Term Energy Efficiency Strategic Plan, California Public Utilities Commission (Sept. 2008, updated Jan. 2011).

and renovations. WE&T also supports educating residential and nonresidential new construction industries on ways to achieve ZNE targets.

d) Expansive Offerings for EE Market Participants

WE&T is a non-resource program, and thus is not expected to provide direct energy savings to the IOU EE portfolio. However, WE&T targets a wide variety of EE market participants throughout the end-use customer sectors of Industrial, Commercial, Residential, Agriculture, and Public. A majority of SCE's WE&T offerings target contractors and technicians who serve HVAC Quality Installation and Maintenance and Advanced Lighting Controls - two areas of significant EE savings. In addition, WE&T offerings serve cross-sector DSM markets aimed at architects, designers, building owner/operators, engineers, facility management and maintenance staff, plans examiners and building inspectors, home energy raters, and auditors that support the workforce. Through WE&T course offerings and educational opportunities, market participants learn how to influence energy savings through their decisions and work performance.

e) Local WE&T Administration & Resources

Many offerings are provided through two dedicated SCE Energy Education Centers located in the greater Los Angeles area (Irwindale) and the San Joaquin Valley (Tulare). Novice and advanced EE professionals attend the training centers, as well as take advantage of in-field, on-location, and online/on-demand training opportunities that expand and enhance access throughout SCE's service territory including disadvantaged and low income communities. SCE's WE&T Program establishes and maintains relationships with educational institutions such as community colleges and trade schools for individuals at different stages in their careers, from post-secondary students exploring entry-level career opportunities to seasoned energy professionals interested in refreshing their knowledge or learning about more advanced technologies and practices.

f) Opportunities

The EE landscape is rapidly evolving in California as aggressive goals have been established and delivery channels, delivery entities, and public funding sources for meeting those goals are expanding. These new opportunities to leverage and coordinate IOU WE&T activities with non-IOU sources of funding and delivery channels will be influenced by legislation, several regulatory proceedings, and other forums that will affect how WE&T may implement and deliver future programs.

g) Intervention Strategies

To address the changing landscape, in 2016, SCE enhanced and streamlined the WE&T Program to be more cost efficient and to focus on training opportunities that offer the most benefit for near-term employment opportunities. This occurred through the consolidation of program management staff that led to a one-stop-shop approach for WE&T programs and through the proposed elimination of K-12 activities, which have minimal impact on the development of DSM skills for workers currently in or about to enter the workforce.[398] SCE must pursue making program adjustments that increase the prudent use of portfolio funds in support of an overall cost-effective EE portfolio. SCE must also properly prioritize WE&T funds that are most likely to result in the workforce ultimately delivering on actual EE savings that support the EE portfolio.

Going forward, SCE plans to consolidate the three WE&T subprograms (Connections, Planning, and Centergies) into one WE&T program offering called Integrated Energy Education and Training (IEET). The consolidated WE&T program will continue and improve upon existing delivery channels for workforce development including planning, training, and post-secondary educational functions. The only significant structural changes SCE proposes is the elimination of K-12 activities that are costly and provide minimal support for achieving the near-term CALTEESP vision. Consolidation of three WE&T programs into the

[398] *See* SCE Advice Letter 3465-E.

IEET will primarily result in fewer duplicative efforts across three individual subprograms, leading to greater cost efficiencies in SCE's program delivery. Also, the IEET will have updated and more clearly defined goals that are tied to specific benefits associated with the overall goals of the DSM portfolio. SCE's Energy Education Centers will leverage IOU and industry resources to address gaps in information or relevant training while also identifying appropriate local and regional workforce training models that may be migrated across the state or integrated into the curriculum of educational institutions such as colleges and trade schools.

5. Collaborations

SCE's Energy Education Centers will collaborate with the education sector, leveraging existing providers for additional resources and training for workers. For example, SCE makes its WE&T curriculum available to educational institutions to either integrate into their own curriculum or for secondary students to be eligible for college credit for their participation in SCE Energy Education Center offerings. SCE will partner with key stakeholders and collaborators for the effective and efficient delivery of these WE&T offerings, including industry and manufacturer trainers, independent providers, trade associations, Community Based Organizations (CBOs), and apprenticeship/pre-apprenticeship training programs throughout the building trades. SCE will continue to collaborate within its service territory with the other administrators and implementers of WE&T programs. SCE will seek out and leverage the best practices of other implementers and reduce any potential duplication of services. WE&T is only one of the many emerging stakeholders and sources of funding to achieve long-term workforce needs, therefore, SCE will actively continue to establish and expand collaborations and information sharing with all parties that positively impact EE savings opportunities in SCE's service territory.

6. WE&T Goals and Strategies

The following sections identify WE&T market barriers, intervention strategies, and tactics that SCE will deploy in support of WE&T and the EE program portfolio goals. SCE proposes several new and modified tasks in supporting the WE&T program. SCE will continue

to gather the actual cost and savings effects resulting from these new and modified tasks on the program budget. SCE will adjust ongoing budget requests as necessary to deliver on the new and modified WE&T tactics identified in this business plan.

Goal 1: Align, enhance, and deliver SCE's WE&T programs through key partnerships and collaborations to effectively address market needs.

Achieving Alignment: In order to position SCE's WE&T programs to effectively support the aggressive energy savings goals outlined in the CALTEESP, the portfolio of current and future offerings, as well as partnerships and collaborations with other key stakeholders and core educational providers, needs to align with and balance the needs of the market and end-use customers and communities SCE serves. Utility EE Program market potential data, California energy policy mandates, continually evolving industry needs, and emerging trends are all factors that should inform WE&T program design and delivery. Achieving this alignment can be difficult in a complex and dynamic EE environment. The 2014 Don Vial Center Guidance Plan for WE&T recommended that the IOUs engage a peer review group to help establish a priority setting process for the development of the WE&T portfolio of offerings.[399] As a result, the joint IOU WE&T leadership established a comprehensive stakeholder engagement process to focus on WE&T program alignment to the EE market. SCE will collaborate with the joint IOU WE&T team to continue this framework for comprehensive stakeholder feedback, and integrate where appropriate, recommendations from reports and other relevant EM&V work product that improve the WE&T program delivery..

Success Through Partnership & Collaboration: A large number of educational providers throughout California have the ability to affect EE. Hundreds of training providers, including community colleges, the state-certified apprenticeship system, colleges and universities, and other institutions participate in a rich training and education infrastructure in

[399] Donald Vial Center on Employment in the Green Economy, Workforce Issues and Energy Efficiency Programs: A Plan for California's Utilities (May 2014) *available a*t http://laborcenter.berkeley.edu/pdf/2014/WET-Plan-Executive-Summary14.pdf.

which IOU WE&T programs play a supporting role.[400] As previously mentioned, cross-cutting WE&T is one element in a complex matrix of key stakeholders, collaborators, and other service providers that cannot solely address all EE market transformation efforts needed to help support the achievement of California's aggressive energy savings goals.

To reinforce and enhance the role of WE&T as a key statewide collaborator in this extensive educational landscape, SCE will intervene by:

- Collaborating with relevant education and training providers to expand or enhance the EE content of their overall training program; and
- Supporting Statewide WE&T Programs and initiatives.

These strategic interventions are supported by a comprehensive array of new and existing cross-cutting tactics, informed by market research and relevant data presented throughout this Sector plan, to be implemented in near, mid, and long-term timeframes. New or enhanced WE&T efforts include, but are not limited to:

- Collaborating with external educational providers to develop and deliver core EE education (e.g., community colleges, unions, vocational schools);
- Supporting workforce development agencies and organizations by providing EE teaching materials and career awareness resources;
- Leveraging IOU resources to develop new or deliver current/relevant WE&T offerings to teaching professionals within post-secondary educational institutions and trade training programs; and
- Continuing support for the development and delivery of other existing and/or new statewide WE&T programs.

Moving forward, SCE's WE&T program staff will collaborate with the joint IOU WE&T program team to initiate new efforts to evaluate program participant data collection, methodology, and metrics development to achieve alignment with near, mid, and long-term

[400] *Id.*

outcomes identified in the revised Program Theory and Logic Model for WE&T from 2014.[401] Additional details on how SCE will implement intervention strategies and tactics to address market barriers and achieve goals are outlined in Table 71.

Table 70. Goal 1 Market Barriers, Intervention Strategies, and Primary Tactics

Market Barriers				
• **The WE&T landscape is complex and diverse, spanning a multitude of skill levels, end-use roles, high-potential markets, and delivery channels** • **California's EE goals are aggressive and require substantial engagement by a diverse mix of stakeholder participants throughout the State** • **EE is often a low priority among workers and other core education providers**				
Intervention Strategies	**Primary Tactics**	**E - Existing N - New M - Modified**	**S - Short-Term M - Mid-Term L - Long-Term**	**Cross-Cutting Sector Focus**
Align WE&T offerings to support the EE market based on EE potential data, policy mandates, industry needs, and emerging trends	Establish a comprehensive engagement and feedback process to inform delivery of the right services to the right audience through the right channels, where stakeholders will be actively engaged and part of a process of continuous improvement and feedback	**E**	**S, M**	**WE&T**
	Leverage energy savings potential studies and job market data to prioritize WE&T offerings in partnership and collaboration with other IOU and non-IOU WE&T Program Administrators	**N**	**S**	**WE&T**
	Implement joint IOU WE&T initiatives locally to support State's goals, where WE&T programs are aligned to State needs and goals, and provide a consistency for the four IOUs	**E**	**S, M, L**	**WE&T**
	Where appropriate, assimilate recommendations from prior EM&V studies, evaluations, and reports, to help ensure alignment and to support joint-IOU efforts	**E**	**S, M, L**	**WE&T**

[401] Opinion Dynamics, 2013-2014 Statewide WE&T Program: Program Theory and Logic Model Update; Centergies Data Needs; and Critical WE&T Data Needs (June 2014), *available at* http://calmac.org/publications/2013-2014_WET_PTLM_and_Critical_Data_Gap_Assessment.pdf.

Market Barriers				
• **The WE&T landscape is complex and diverse, spanning a multitude of skill levels, end-use roles, high-potential markets, and delivery channels** • **California's EE goals are aggressive and require substantial engagement by a diverse mix of stakeholder participants throughout the State** • **EE is often a low priority among workers and other core education providers**				
Intervention Strategies	**Primary Tactics**	**E - Existing N - New M - Modified**	**S - Short-Term M - Mid-Term L - Long-Term**	**Cross-Cutting Sector Focus**
Collaborate with relevant education and training providers to expand or enhance the EE content of their overall training program	Collaborate with external educational providers to deliver core EE education (e.g., community colleges, unions, vocational schools, etc.)	**E, N**	**S, M, L**	**WE&T**
	Collaborate with targeted organizations to expand access and reach to WE&T programs	**E, N**	**S, M, L**	**WE&T**
	Support specific industry-recognized certifications as well as workforce development agencies & organizations by providing EE teaching materials and career awareness resources	**E, N**	**S, M, L**	**WE&T**
	Leverage IOU resources to develop new or deliver current/relevant WE&T offerings to teaching professionals within current education providers as well as trade training programs	**E, N**	**S, M, L**	**WE&T**
	Develop and share specific curriculum for high-potential opportunities with other education providers	**E, N**	**S, M, L**	**WE&T**
	Provide seed funding for curriculum development and sharing initiatives	**E, N**	**S, M, L**	**WE&T**
	Leverage established core WE&T offerings for direct infusion or articulation into the training portfolios of other education providers	**E, N**	**S, M, L**	**WE&T**
Support Statewide WE&T Programs and initiatives	Continue to support the delivery of the joint-IOU-offered curriculum and other energy center specific EE educational resources	**E**	**S, M**	**WE&T**
	Support the development and delivery of other existing and/or new statewide WE&T programs (e.g. Career Connections, Career and Workforce Readiness Programs).	**N**	**M, L**	**WE&T**

Goal 2: In support of the State's aggressive long-term energy savings goals, equip the current and future California EE workforce with the knowledge and skills to help achieve EE program goals.

CALTEESP states that utility WE&T offerings play a significant role in advancing the state's EE and DSM goals by ensuring the training and engagement of workers with the proper skills to carry out the work. Energy code and policy drivers, technologies, and tools are dynamic and ever changing; thus, it is important for incumbent workers to receive continuing education and training to fully realize energy savings and remain competitive in the marketplace. SCE's WE&T program will continue to deliver technical training, continuing education, and pathways to industry-valued certifications, to ensure a trained and skilled workforce that can deliver energy savings.

To help fulfill this vision, SCE's WE&T program will intervene by:

- Developing and delivering WE&T offerings to support/shape the EE market and achieve the State's aggressive energy savings goals, based on EE potential data, policy mandates, industry needs, emerging trends, and IOU EE Portfolio goals;
- Assisting workers from disadvantaged communities in gaining skills leading to employment and/or advancement in rewarding career track jobs in EE fields; and
- Enhancing and modifying where appropriate, EE market and skills building educational offerings, resources, and tools that support and advance the WE&T portfolio of workshops and seminars.
- Providing EE education opportunities along an educational pathway for post-secondary students and the potential EE workforce that includes career awareness, core energy education, and career enhancement and technical upskill.

These strategic interventions are supported by a comprehensive array of new and existing cross-cutting tactics, informed by market research and relevant data, to be implemented in near, mid, and long-term timeframes. New WE&T efforts include, but are not limited to:

- Developing and delivering technician and installer training that will support meter-based energy savings projects. This training will enhance the skills necessary to measure energy savings at the time of intervention, upon measure installation, or at project completion;
- Developing targeted training to enhance soft skills in the technician and maintainer roles across sectors and sub-sectors, and promote the value proposition of EE to end-use customers;
- Developing and delivering EE program opportunity and new technology training targeted towards the distributor community; and
- Developing and delivering new Agricultural-focused offerings targeted towards high-potential market actors and decision makers that focus on EE program participation opportunities, new and emerging technologies, and available financing opportunities.

Details on how SCE will implement intervention strategies and tactics to address this market barrier are outlined in Table 72.

Table 71. Goal 2 Market Barriers, Intervention Strategies, and Primary Tactics

Market Barriers
• **The WE&T landscape is complex and diverse, spanning a multitude of skill levels, end-use roles,** high-potential markets, and delivery channels; • **EE is often a low priority among workers and other core education providers** • **Key market actors and decision makers do not always understand the value of EE** • **Awareness of WE&T** and EE opportunities is a significant barrier to participation in WE&T offerings • **California's energy code is complex and constantly changing**

Intervention Strategies	Primary Tactics	E - Existing N - New M - Modified	S - Short-Term M - Mid-Term L - Long-Term	Cross-Cutting Sector Focus
Develop and deliver WE&T offerings to support / shape the EE market and achieve the State's aggressive EE goals, based on EE potential data, policy mandates, industry needs, emerging trends, and IOU EE Portfolio goals.	Develop and deliver technician and installer training that will support meter-based energy savings projects related to AB 802 implementation	**N**	**S, M, L**	**Cross-Cutting**
	Develop and deliver EE program opportunity and new technology training targeted towards the distributor community as the EE Portfolio shifts downstream offerings more to midstream	**N**	**S, M, L**	**Cross-Cutting**
	Continue to deliver industry-valued commercial advanced lighting controls installation and commissioning curriculum and pathways to certification	**E**	**S, M**	**Commercial**
	Support the development of curricula and other related educational resources to help improve commercial lighting system design	**N, M**	**S, M**	**Commercial**
	Work with current commercial advanced lighting controls training providers to enhance the existing curriculum by integrating major manufacturer training	**N**	**M, L**	**Commercial**
Develop and deliver WE&T offerings to support / shape the EE market and achieve the State's aggressive EE goals, based on EE potential data, policy mandates, industry needs, emerging trends, and IOU EE Portfolio goals.	Work with current training providers to enhance technical and soft skills offerings that target the following subjects: • Understanding the lifecycle of installed Commercial measures • Knowledge of, and how to sell additional EE opportunities to end-use customers • Understanding end-use customer needs • Right-sizing of equipment and systems • Ability to bid, manage, and supervise projects • Knowledge of systems integration and overall functions/components	**M**	**S, M**	**Commercial**

Intervention Strategies	Primary Tactics	E - Existing N - New M - Modified	S - Short-Term M - Mid-Term L - Long-Term	Cross-Cutting Sector Focus
	Continue to deliver industry-valued standards-based commercial HVAC quality installation and maintenance curriculum and pathways to certification	**E**	**S, M, L**	**Commercial**
	Continue to deliver industry-valued standards-based residential HVAC quality installation and maintenance curriculum and pathways to certification	**E**	**S, M, L**	**Residential**
	Work with current training providers to enhance Residential HVAC technical and soft skills offerings that target the following subjects: • Understanding the lifecycle of installed Commercial measures • Knowledge of, and how to sell additional EE opportunities to end-use customers • Understanding end-use customer needs • Right-sizing of equipment and systems • Ability to bid, manage, and supervise projects • Knowledge of systems integration and overall functions/components	**N**	**M, L**	**Residential**
Develop and deliver WE&T offerings to support / shape the EE market and achieve the State's aggressive EE goals, based on EE potential data, policy mandates, industry needs, emerging trends, and IOU EE Portfolio goals.	Partner with CA Community Colleges and relevant trades to build curriculum targeted to building operators and facility managers that addresses HVAC QI / QM gaps	**N**	**M, L**	**Commercial / Industrial**
	• Focus efforts in local jurisdictions through in-field offerings to Plans Examiners, Building Inspectors, and other decision makers in Government on baseline code and expected changes in future code, while encouraging the adoption of voluntary or measure-specific reach codes. • Continue to collaborate with IOU Codes and Standards, Compliance Improvement teams to design, develop, and deliver relevant and timely codes training	**E**	**S, M**	**Public**
	Continue to collaborate with IOU Codes and Standards, Compliance Improvement teams to design, develop, and deliver relevant and timely codes training to high-potential market actors and decision makers	**E, N, M**	**S, M**	**Commercial/ Industrial**

Intervention Strategies	Primary Tactics	E - Existing N - New M - Modified	S - Short-Term M - Mid-Term L - Long-Term	Cross-Cutting Sector Focus
	• Develop new curriculum and other educational tools and offerings, targeted to high-potential market actors and decision makers, to enhance knowledge of technological innovations and integrated business strategies that are required to effectively understand, interpret, and meet the ZNE goals. • Help develop a well-informed support industry including building inspectors, financial and real estate professionals, and other industries central to the advancement of ZNE	**N**	**M, L**	**Residential**
	Develop new curriculum and other educational tools and offerings, targeted to high-potential market actors and decision makers, to enhance knowledge of technological innovations and integrated business strategies that are required to effectively understand, interpret, and meet the ZNE goals	**N**	**M, L**	**Commercial**
	Partner with IOU Savings By Design teams and other key industry stakeholders to develop integrated, whole building design curricula for targeted, high-potential market actors and decision makers in the Commercial new construction sector	**N**	**M, L**	**Commercial**
Develop and deliver WE&T offerings to support / shape the EE market and achieve the State's aggressive EE goals, based on EE potential data, policy mandates, industry needs, emerging trends, and IOU EE Portfolio goals.	Enhance Benchmarking and Multifamily Energy Star® Portfolio Manager training awareness, availability, and frequency to high-potential market actors, decision makers, and building owners	**M**	**M, L**	**Commercial / Residential**
	• Align WE&T offerings to both Commercial and Residential whole building/integrated energy efficiency, to enhance EE opportunity awareness and skills. • Aside from traditional workshops and seminars, provide enhanced technical consultations, equipment demonstrations, and building performance tool loans from the Tool Lending Library.	**N, M**	**S, M, L**	**Commercial / Residential**
	Include special skills training in core WE&T activities to help meet demand, spur	**E**	**S, M**	**Cross-Cutting**

Intervention Strategies	Primary Tactics	E - Existing N - New M - Modified	S - Short-Term M - Mid-Term L - Long-Term	Cross-Cutting Sector Focus
	innovation, and increase the body of knowledgeable building professionals.			
	Develop new Ag-focused offerings targeted towards high-potential market actors and decision makers that focus on EE program participation opportunities, new and emerging technologies, and available financing opportunities, while collaborating with other educational providers to expand access and reach of WE&T offerings.	**N**	**M, L**	**Agricultural**
	The IOUs will offer targeted Energy Efficiency Sales training programs to help increase energy savings potential, bring awareness to the value of energy efficiency, and support market transformation in market actors and decisions makers across industry sectors	**N**	**M, L**	**Cross-Cutting**
Assist workers from disadvantaged communities in gaining skills that may lead to employment and/or advancement in rewarding career track jobs in EE fields	Support the development and delivery of the proposed Statewide Career and Workforce Readiness Pilot Program	**N**	**M, L**	**WE&T**
	Collaborate with other educational and/or service providers who already have connections and pathways to reach high-potential WE&T participants from disadvantaged communities (e.g. WIBs, CBOs, etc.)	**N**	**M, L**	**WE&T**
	Leverage the tools developed and knowledge gained from IOU WE&T Inclusion studies to inform activities and tactics with high-potential participants from disadvantaged communities	**N**	**S, M, L**	**WE&T**
Enhance and modify where appropriate, EE market and skills, building educational offerings, resources, and tools that support and advance WE&T portfolio of workshops and seminars.	Develop new hands-on teaching tools, exhibits, demonstrations, and training equipment that aligns with the portfolio of educational offerings to enhance the learning environment and drive adult learning principles	**N, M**	**M, L**	**WE&T**
Providing EE education opportunities along an educational	Support the development and delivery of other existing and/or new statewide WE&T programs	**N**	**M, L**	**WE&T**

Intervention Strategies	Primary Tactics	E - Existing N - New M - Modified	S - Short-Term M - Mid-Term L - Long-Term	Cross-Cutting Sector Focus
pathway for post-secondary students and the potential EE workforce that includes career awareness, core energy education and career enhancement and technical upskill.				

Goal 3: Design and deliver a WE&T program that continuously enhances the performance of SCE's EE Portfolio.

SCE's WE&T offerings, delivered either through the Energy Education Centers, online or on-demand, or in the field, have a unique opportunity to interact with key decision makers in high-potential sectors and cultivate new EE opportunities and Program participants. Leveraging opportunities to lower program costs while still delivering comprehensive and compliant programming, are necessary in a dynamic and complex EE environment.

Additionally, in support of SCE's overall EE portfolio cost-effectiveness initiatives, it is incumbent upon SCE's WE&T program to ensure it is operating as efficiently as possible. As a cross-cutting program, WE&T also plays a key role in providing targeted support to the EE portfolio by ensuring the training and engagement of workers installing and implementing EE measures and projects with the proper skills to carry out the work.

To enhance and increase efficacy in this area, and to support the EE portfolio in overcoming cost-effectiveness challenges, SCE's WE&T program will:

- Reinforce WE&T as a support and advisory role to the EE portfolio, providing efficiency and cost-effective interventions, offerings, and other educational resources targeted to specific portfolio needs, across all sectors;

- Enhance and streamline the WE&T Program to facilitate cost efficiencies and focus on training opportunities that offer the most benefit for near term employment opportunities;

- Modify offering design and delivery to lower program implementation costs throughout the WE&T portfolio; and

- Improve and expand access and reach, building awareness in high-potential sectors and target markets, while enhancing customer experience and ease of participation;

Details on how SCE will implement intervention strategies and tactics to address this market barrier are outlined in Table 73.

Table 72. Goal 3 Market Barriers, Intervention Strategies, and Sample Tactics

Market Barrier
• **EE is often a low priority among workers and other core education providers** • **Key market actors and decision makers do not always understand the value of EE** • **Awareness of WE&T and EE opportunities is a significant barrier to participation in WE&T offerings** • **Maintaining operational efficiency and effectiveness of WE&T is challenging in a complex and continuously evolving EE market**.

Intervention Strategies	Primary Tactics	E - Existing N - New M - Modified	S - Short-Term M - Mid-Term L - Long-Term	Cross-Cutting Sector Focus
Reinforce WE&T as a support and advisory role to the EE portfolio providing efficiency and cost-effective interventions, offerings, and other educational	Drive awareness of EE program opportunities through applicable WE&T offerings	**E, M**	**S, M, L**	**Cross-Cutting**
	Train and prepare high-potential participants for applicable EE Programs and other EE opportunities	**E, M**	**S, M, L**	**Cross-Cutting**

Intervention Strategies	Primary Tactics	E - Existing N - New M - Modified	S - Short-Term M - Mid-Term L - Long-Term	Cross-Cutting Sector Focus
resources targeted to specific portfolio needs across all sectors	Educate high-potential market actors and decision makers in key sectors and end-use roles on key EE policy and code requirements	**E**	**S, M, L**	**Cross-Cutting**
	Provide tactical and operational support for program- and sector-specific education and training needs	**E**	**S, M, L**	**Cross-Cutting**
support and advisory role to the EE portfolio providing efficiency and cost-effective interventions, offerings, and other educational resources targeted to specific portfolio needs across all sectors	Leverage the technical subject matter expertise and direct connection to end-use customers, decision makers and market actors throughout the Centergies program to cultivate new EE opportunities and Program participants	**E**	**S, M, L**	**Cross-Cutting**
Enhance and streamline the WE&T Program to facilitate cost efficiencies and focus on training opportunities that offer the most benefit for near term employment opportunities	Consolidation of program management staff that will lead to a one-stop-shop approach for WE&T programs and through elimination of activities, such as K-12, that have minimal impact on enabling the development of workforce skills needed to support DSM programs today	**N**	**S, M**	**WE&T**
	Restructure the three WE&T subprograms (Connections, Planning, and Centergies) into one consolidated WE&T program	**N**	**S, M**	**WE&T**
Modify offering design and delivery to lower program implementation costs throughout the WE&T portfolio	Actively participate in joint-IOU efforts to deliver a set of consistent market-building offerings through an online/on-demand learning platform	**E, N**	**S, M, L**	**Cross-Cutting**
Improve and expand access and reach, building awareness in high-potential sectors and target markets, while enhancing customer experience and ease of participation	Collaborate with Statewide ME&O on joint-IOU promotion and awareness efforts, focusing on both statewide and regional opportunities	**E**	**M, L**	**WE&T**
	Collaborate with other educational and/or service providers who already have connections and pathways to reach high-potential WE&T participants	**E, N**	**M, L**	**WE&T**

7. Workforce Education and Training Budget

Table 74 shows SCE's planned budget for the WE&T program for 2018-2025. More details about SCE's budgeting process are described in the Portfolio Summary chapter (Section III.F).

Table 73. SCE's WE&T Proposed Budget for 2018-2025 Table 74. SCE's Emerging Technologies Proposed Budget for 2018-2025

Program Year	Administration ($000)	Marketing ($000)	Direct Implementation ($000)	Incentives ($000)	Total Sector Budget ($000)
2015[402]	$1,173	$345	$8,517	$-	$10,035
2016[403]	$399	$283	$5,891	$97	$6,670
2017[404]	$291	$-	$4,554	$-	$4,845
2018	$291	$-	$4,554	$-	$4,845
2019	$300	$-	$4,691	$-	$4,990
2020	$306	$-	$4,784	$-	$5,090
2021	$300	$-	$4,689	$-	$4,988
2022	$309	$-	$4,829	$-	$5,138
2023	$318	$-	$4,974	$-	$5,292
2024	$328	$-	$5,123	$-	$5,451
2025	$337	$-	$5,277	$-	$5,614

8. Metrics

SCE proposes a set of metrics for WE&T to measure the progress towards the goals of the program and the effectiveness of the intervention strategies and tactics outlined in this business plan. Metrics are one of several components used in examining the success and effectiveness of the Program (e.g., in addition to EM&V studies). The metrics are designed to measure progress against the intended outcomes and priorities of the WE&T cross-cutting sector.

Historically, the effectiveness of IOU WE&T offerings has been reported through data and indicators that focus on output-oriented activity. The metrics outlined in the table below seek to examine the effect of WE&T on the EE market through outcome-oriented activity

402 Actual expenditures.
403 Actual operating budget.
404 Proposed budget.

and indicators. These metrics not only support the priorities and intended outcomes of SCE's WE&T activities, but also align with recommendations from recent research and reports, such as the 2013-2014 Statewide WE&T Program Theory Logic Model Update (PTLM).[405] The most recent update to the WE&T PTLM recommends specific data needs and short-term, measurable outcomes that can help WE&T programs support California's long-term strategic energy efficiency goals. These outcomes include, but are not limited to:

- Increased partnership and collaborations with key stakeholders and core education providers to enhance the delivery of WE&T;
- Enhanced awareness and knowledge of EE, DR, and DG opportunities and/or best practices by high-potential end-users;
- Improved skills of participants who implement EE projects; and
- Increased WE&T awareness and activity in disadvantaged communities.

The metrics outlined in Table 75 support and begin to build upon these recommendations, and seek to indicate the success of WE&T efforts in supporting the State's aggressive energy savings goals.

[405] Opinion Dynamics, 2013-2014 Statewide WE&T Program: Program Theory and Logic Model Update; Centergies Data Needs; and Critical WE&T Data Needs (June 2014), *available at* http://calmac.org/publications/2013-2014_WET_PTLM_and_Critical_Data_Gap_Assessment.pdf.

Table 75. WE&T Sector Metrics[406]

Desired Sector Outcome	Intervention Strategies	Sector Metric	Short-Term Target (1-3 years)	Mid-Term Target (4-7 years)	Long-Term Targets (8-10+ years)
Goal: Align, enhance, and deliver SCE's WE&T programs through key partnerships and collaborations to effectively address market needs.					
Increased collaborations with key stakeholders and core education providers to enhance awareness and knowledge of EE, DR, and DG opportunities and/or practices for high-potential end-users	• Align WE&T offerings • Collaborate with relevant education and training providers to expand or enhance the energy efficiency content • Support Statewide WE&T Programs and initiatives	# of initiatives delivered through key stakeholders and core education providers that target high-potential end-users	Evaluation criteria defined and measurement to establish baseline begins	% increase in initiatives delivered through key stakeholders and core education providers	% increase in initiatives delivered through key stakeholders and core education providers
WE&T offerings are aligned to help effectively support CALTEESP, Policy, Industry, and IOU EE Portfolio Goals	Evaluate WE&T offerings and restructure and/or design programs accordingly to focus on highest-potential and best alignment with market needs	% offerings that align with market needs	Evaluation criteria defined and measurement to establish baseline begins	100% of WE&T offerings are aligned with market needs	100% of WE&T offerings are aligned with market needs
Goal: In support of the State's aggressive long-term energy savings goals, equip the current and future of California EE workforce with the knowledge and skills to help achieve EE program goals.					
Improved skills of participants who implement EE projects	Develop and deliver WE&T offerings to support / shape the EE market and achieve the State's aggressive EE goals, based on EE potential data, policy mandates, industry needs, emerging trends, and IOU EE Portfolio goals	% offerings targeted to high-potential/impact areas of focus	Evaluation criteria defined and measurement to establish baseline begins	% increase in offerings targeted to high-potential/impact areas of focus	% increase in offerings targeted to high-potential/impact areas of focus
	Assist workers from disadvantaged communities in gaining skills that may lead to employment and/or advancement in rewarding career track jobs in EE fields	% offerings that reach disadvantaged workers[407]	Evaluation criteria defined and measurement to establish baseline begins	% increase in offerings that reach disadvantaged workers	% increase in offerings that reach disadvantaged workers
	• Enhance and modify where appropriate, EE market and skills, building educational offerings, resources, and tools that support and advance	% market penetration in eligible high-potential	Evaluation criteria defined and measurement to establish baseline begins	% increase in market penetration in the eligible high-potential participant pool	% increase in market penetration in the eligible high-potential participant pool

[406] The source data for most of the WE&T metrics is WE&T program data and documentation. Because most of these are new metrics, there is not yet a baseline for most.

[407] The baseline for this metric will be determined by evaluating WE&T program data and documentation.

Desired Sector Outcome	Intervention Strategies	Sector Metric	Short-Term Target (1-3 years)	Mid-Term Target (4-7 years)	Long-Term Targets (8-10+ years)
	WE&T portfolio of workshops and seminars Providing EE education opportunities along an educational pathway for post-secondary students and the potential EE workforce that includes career awareness, core energy education and career enhancement and technical upskill	participant pool[408]			
Goal: Design and deliver a WE&T program that enhances the performance of SCE's EE Portfolio					
Enhanced awareness and knowledge of EE, DR, and DG opportunities and/or best practices by high-potential end-users	• Reinforce WE&T as a support and advisory role to the EE portfolio providing efficiency and cost-effective interventions, offerings, and other educational resources targeted to specific portfolio needs across all sectors	% WE&T participants who pursue EE rebate or incentive programs	Evaluation criteria defined and measurement to establish baseline begins	% increase in WE&T participants who pursue EE rebate or incentive programs	% increase in WE&T participants who pursue EE rebate or incentive programs

9. Coordination and Integration

The Joint IOU WE&T Team has developed an overarching program administration structure that coordinates efforts across the IOUs. This structure allows for statewide solutions with regional implementation addressing workforce needs. The IOU WE&T team acts as a statewide advisor and implementer of WE&T opportunities for EE stakeholders. The IOU WE&T Team holds frequent coordination meetings to address best practices, new opportunities, and statewide engagement with all market actors in support of meeting the State's EE goals. The IOU WE&T team leverages the collective skills of the four IOUs and WE&T stakeholders, allowing for the engagement of a very broad and active network of WE&T partners.

[408] In addition to WE&T program data, EE market potential within key / high-potential participants will be used.

SCE will collaborate within its service territory with other non-IOU implementers of WE&T programs. SCE will seek to leverage the best practices of other implementers and to also reduce any potential duplication of services.

To validate that the IOU WE&T teams are focused on collaboratively making the programs a success both at a local and statewide level, SCE has committed to the mission, values, and strategic framework identified below:

a) Coordinated IOU WE&T Mission

To facilitate, support, and provide subject matter expertise for the transfer of EE knowledge and skills to the industry across all sectors, balancing the needs of the state and customers.

b) IOU WE&T Values

Coordinated IOU WE&T values include:

- **Be Customer & Market Driven:** Utilize customer and market data to guide and inform programs.
- **Be Collaborative:** Leverage the strengths and expertise of external and internal stakeholders to become a state of the art education, technology and resource center.
- **Be Accessible:** Optimize accessibility for target audiences in EE.
- **Be Innovative:** Explore and implement new approaches to achieve goals.
- **Be Integrative:** Design offerings to reflect and support an integrated approach to EE.
- **Be Technically & Operationally Excellent:** Expand use of technical capabilities and subject matter expertise in EE as well as enhance operational effectiveness in the design and delivery of program services.

c) Coordinated IOU WE&T Strategic Framework

The Strategic Framework encompasses the following themes for WE&T's efforts:

- Collaborations and partnerships are critical to the success of WE&T statewide and locally;
- Engagement with internal and external stakeholders must be part of an ongoing and continuous improvement process;
- Better data, better analysis and better measurement is essential to create relevant and valuable training and education offerings; and
- The quantity of training and education opportunities does not have as much impact as ensuring that the right information is delivered to the right people, in the right way.

The Strategic Framework will focus its effort to address key issues and market barriers. The Joint IOU WE&T Team identified five strategies to guide future initiatives, resource allocation, and approach to overarching WE&T goals:

1. Implement statewide WE&T initiatives locally to support State goals.
   Objective**:** WE&T programs are aligned to State needs and goals, and provide a consistent framework for the four IOUs.
2. Target value-added collaborations with statewide stakeholders and other education & training providers.
   Objective: The network of collaborators will complement and expand WE&T's reach and depth of EE concepts and activities with key audiences.
3. Establish a comprehensive engagement and feedback process to enable delivery of the right services to the right audience through the right channels.

4. Objective: Stakeholders will be actively engaged and part of a process of continuous improvement and feedback.
5. Improve and expand access and reach, build awareness, and make it easier to participate in WE&T programs.

   Objective: Key audiences participation, depth of knowledge, and satisfaction increases.
6. Manage and implement Joint WE&T efforts to be efficient, adaptable, and accountable.

   Objective: Targeted market and customer data analysis and project management leads to more relevant and valuable programs that support energy savings.

d) Coordinated IOU WE&T Programs

SCE supports the development and delivery of anew statewide proposed downstream WE&T pilot program. SCE will adjust ongoing budget requests as necessary to deliver on the new WE&T pilot program. For more details on the newly proposed WE&T downstream pilot program, Career and Workforce Readiness, please refer to the PG&E WE&T Business Plan.

10. Future Look

SCE's proposed future look includes the elimination of Connections K-12 and the creation of the Statewide Career & Workforce Readiness Pilot for disadvantaged communities. SCE recognizes that its' program design may slightly differ from the other IOU statewide proposals, but it represents SCE's streamlined program design that balances the regulatory requirement for SCE to have an overall cost-effective portfolio with the ongoing mission to continue WE&T as a value-added resource in support of the SCE portfolio. To accomplish the goals and strategies laid out by SCE, Table 76 outlines a restructuring of the WE&T program to create a clearer pathway for participants, roles and responsibilities, and how IOU WE&T programs work in conjunction with other education providers.

Table 76. SCE WE&T Future Look

Program & Program Components	Integrated Energy Education & Training (IEET) SW Career & Workforce Readiness Pilot	Core Energy Education	Technical Upskill
Primary Audience	People not prepared to enter a traditional energy job/career higher education path (e.g., disadvantaged communities and workers)	People on a chosen educational track toward a job/career: - Post-secondary students - Adults - Retraining for those on an energy career path	People in a job/career seeking energy-focused upskilling: - Engineering & design professionals - Technical trades / journeymen
Offerings and Purpose	- Career prep/job readiness services (via partnerships) - Gain skills that may lead to employment and/or advancement in a job in the EE field	- Track-specific technical education and training - Support for teaching materials development - Train-the-Trainer - "Kick-Start / early stage" initiatives support - Building performance measurement tools	- High-level and in-depth training - Targeted offerings for specific occupations - Certification program support
Primary Organizations for Strategic Partnerships	- Workforce Investment Boards - Community-based organizations - Job-training organizations	- Colleges - Job-training organizations - Vocational Schools - Labor/Unions - Trade Associations - Apprenticeship & Pre-apprenticeship - Community-based orgs.	- University Extension Programs - Certification agencies & programs - Professional and Trade Associations and Agencies
Outcomes	Knowledge gain, using gained knowledge and skills on the job, expanding/enhancing other organizations' curricula. Combined outcomes should lead to EE program savings and support SCE's portfolio goals.		

11. EM&V Considerations

Benefiting from Lessons Learned from Prior EM&V Studies: The WE&T program has evolved and benefitted from evaluations in recent years. These evaluations have provided insights into ways the program has been successful as well as ways in which the program may be modified and improved. Evaluations conducted from 2006-2008 informed key ways to modify program design and delivery to better achieve the program's goals. This included such things as an increased focus on key technologies and increasing efforts to direct customers and contractors to rebate programs. In addition, there were recommendations on how to improve program tracking and monitoring. Subsequent evaluations conducted during 2010-12 and 2013-14 provided useful information on ways in which the program's offerings can facilitate

the overall goals of WE&T as set forth by the Strategic Plan. This work provided suggestions on how to increase the program's reach and how to refine courses with greater emphasis on skill building and "real-world" applications of the material.

The Evaluation results from several studies conducted during 2010-12 provided direction and a general framework for making ongoing changes to the WE&T programs. For example, SCE has increased (a) delivery of content and course via internet and online resources, (b) attention to "skills building" efforts, in conjunction with "market building." Additional research during 2014 examined key activities, elements, outputs and outcomes of the programs and provided updated information for the program's theory and logic model. Based on some of the findings and recommendations, SCE has modified course content, target marketing strategies, and the type and nature of data collection solicited from program participants. For example, SCE has initiated refinements to data collection and tracking efforts based on support program improvements as well as measurement of metrics and potential market transformation indicators.

More recently completed CPUC studies (a) examined relevant job quality and work quality collection needs[409] and (b) characterized the training market for three programs (Home Upgrade, Residential HVAC, and Non-Residential Lighting).[410] The initial effort provided some insights and suggestions regarding the feasibility and relevance of job and work quality data collection. The second phase offered information about the overlaps of trainings and relevant issues that limit participation (e.g., limited awareness). The joint IOUs also recently completed a program-funded initiative to address research questions related to training & advancement for disadvantaged workers in EE careers. Overall the research efforts provided insights on ways to continue to improve the program's targeting and effectiveness. They also

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[409] *See* Opinion Dynamics, PY2013–2014 California Statewide Workforce Education and Training Program: Workforce Conditions Data Investigation, (Dec. 2015), *available at* http://www.calmac.org/NewPubs.asp.

[410] *See* Opinion Dynamics, PY2013-2014 California Statewide Workforce Education and Training Program: Contractor Training Market Characterization (June 2016), *available at* http://www.calmac.org/publications/CPUC_WET_Contractor_Training_Market_Characterization_FINAL.docx.

identified gaps in understanding and data that will limit applicability of these data for assessing specified outcomes. In particular, the programs and CPUC still lack potential financial and other resource costs relative to the benefits of various recommendations which is likely warranted to best understand role of WE&T efforts on overall portfolio and in serving larger GHG goals.

As SCE's WE&T efforts move into more concrete implementation of the plans, it is likely that needs are identified and these data collection and tracking systems will evolve to facilitate measurement of the program against the more refined and established goals and metrics. Overall, to the extent prior evaluations and recommendations remain relevant the results will continue to guide SCE's approach to refining the WE&T Program to meet relevant workforce needs while remaining focused on achieving overall savings for SCE's EE portfolio and achieving the State's EE policy goals.

Increased Understanding of WE&T in the Context of Market Transformation: Measuring the effectiveness of market transformation and behavior change efforts is challenging. By nature, WE&T efforts support many types of programs (e.g., low-income, residential, commercial, agricultural, and industrial, etc.) and broad, longer term goals associated with market transformation. In a 2011 CPUC-led market transformation workshop, participants widely concluded that indicators of market transformation are not always achieved through simple data collection, and that other methodologies and unconventional data collection efforts are sometimes needed, due to the complicated landscape of market transformation and behavior change.[411]

Increased Focus on Data-Driven Approach to Measure Impact: Ongoing and historical measurement and evaluation research have provided insights on ways to enhance program data collection, metrics development, measurement and evaluation, and reporting. For

[411] *See* Ralph Prahl & Ken Keating, Planning and Evaluating Market Transformation: What the Industry has Learned, and Possible Implications for California, (Oct. 2011), *available at* ftp://ftp2.cpuc.ca.gov/PG&E20150130ResponseToA1312012Ruling/2011/10/SB_GT&S_0821376.pdf.

example, recent research indicates that participant data collection and subsequent analytics focus on level of activity vs. potentially more relevant longer term or market transformation indicators.[412] Although the value of WE&T for the EE industry has been articulated in numerous studies the data that connects programs with EE market potential and influence is limited and/or may be based on outdated economic and other market indicators.[413] Traditional EM&V methods may not accommodate the complex environment associated with non-resource cross cutting programs that may play a meaningful role in larger market transformation efforts. As the industry evolves, likewise the tools and approaches for measurement continue to evolve. SCE expects that new approaches for measuring the effectiveness of WE&T will help increase efficacy and relevancy of efforts to better understand value and impact of WE&T as it relates the program's contribution to larger goals of reductions in GHG for the State. The last time savings outcomes from WE&T efforts was attempted was in 2006-08 via an Indirect Impact Evaluation. Based on various assumptions regarding behavioral changes of a selection of participants it was estimated that the collective Energy Centers produced "a yearly impact of approximately 700 GWh with a net impact of 544 GWh… and approximately 6 million net therms. Respectively these electric and gas savings equated to approximately 267,000 and 30 metric tons of avoided Carbon Dioxide emissions…providing an additional 5% to the overall projected energy impact of the portfolio".[414]

While the "effectiveness" of WE&T efforts is not exclusively or easily quantified via savings outcomes, approaches to understanding and measuring the effect of educational programs continues to evolve. For measuring the effectiveness of WE&T, SCE will continue to

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[412] Opinion Dynamics, Indirect Impact Evaluation of the Statewide Energy Efficiency Education and Training Program (2009), *available a*t http://www.calmac.org/publications/06-08_Statewide_Education_and_Training_Impact_Eval_Vol_I_FINAL.pdf**.**

[413] Opinion Dynamics, 2013-2014 Statewide WE&T Program - Program Theory and Logic Model Update; Centergies Data Needs; and Critical WE&T Data Needs, (June 2014).

[414] Opinion Dynamics, Indirect Impact Evaluation of the Statewide Energy Efficiency Education and Training Program, p. 2, (2009), *available a*t http://www.calmac.org/publications/06-08_Statewide_Education_and_Training_Impact_Eval_Vol_I_FINAL.pdf**.**

consult with evaluation experts within the utilities, at the CPUC as well as via external consultants to enhance data collection and enable rigorous measurement solutions that align with program goals, policy mandates, and CPUC directives, while driving the value of WE&T market transformation activities. More timely, consistent, and systematic data and results will increase SCE's understanding of the value and efficiency of WE&T offerings for participants and the overall cost-effectiveness of the EE portfolio.

Tighter Linkage of Measurement and Evaluation to Evolving Program Needs: EM&V evaluations and assessments highlight the importance of having clearly defined goals and logic that subsequently can be closely aligned with key program direction, activities and ultimately the achievements of the program. Because studies are often conceived and executed over a longer time frame and unable to accommodate research implementation issues or data gaps discovered as part of the research process the results become less helpful or actionable for the programs and/or policy makers to respond to. The rolling portfolio process allow the WE&T program an opportunity to establish EM&V needs and research plans based on the current needs and status of the program rather than rely on a research process tied to three-year funding cycles that sometimes ultimately yields more antiquated information for programs.

The EM&V long-term research roadmaps provide stakeholders, implementers and EM&V staff the opportunity to consider and review ongoing studies or proposed studies based on evolving program needs. The recently updated roadmaps include several current and upcoming studies that build on specific identified research needs from legislation and programs. For example, the CPUC's "Responsible Contractor Policy for EE Programs"[415] study was conceived to replace a proposed cost-benefit analysis phase of the "Skill Standards for IOU Research Programs"[416] study, which was deemed no longer viable or appropriate. The "Responsible Contractor Policy Study" is a qualitative, policy-oriented effort initiated in

[415] Opinion Dynamics, Responsible Contractor Policy for EE Programs: Market Intelligence Study (in process).

[416] Opinion Dynamics, 2013-2015 WE&T Skill Standards for IOU Resource Programs Study (in process).

response to SB 350 requirements. The study is expected to inform the current and future state of contractor requirements for retrofit and maintenance programs as well as opportunities and challenges associated with implementing such a policy. The roadmap also identifies a relevant upcoming IOU study (Course Outcomes Study), that is expected to gather information in service of better understanding how the WE&T course content affects or is relevant to the jobs of those who attended. Based on objectives outlined in the business plans, the study will consider specified longer term outcomes that have not yet been examined in assessments of the program's impact on the workforce. As noted above, assessing the effectiveness of educational programs such as WE&T will likely require a complex approach and a number of measurements and assumptions that tie to relevant longer term market transformation indicators.