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**Southern California Edison**  
**Energy Efficiency Business Plan**  
**Cross-Cutting: Codes & Standards Chapter**  
**DRAFT October 28, 2016**

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## I. Overview & Approach

The current statewide Codes and Standards (C&S) Program (“C&S 1.0”) has contributed to California’s energy efficiency (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 greenhouse gas (GHG) reductions, EE, renewable energy, energy storage, zero net energy (ZNE) buildings, water efficiency, and clean transportation. The “C&S 2.0” vision builds upon the most successful 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.

Activities that will support the C&S 2.0 vision include, but are not limited to, the following:<sup>1</sup>

### A. Existing Subprograms

1. **Planning and Coordination subprogram.** The C&S Program will expand activities to include working with DSM incentive and financing program staff, other cross-cutting programs, and investor-owned utility (IOU) transmission and distribution (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 statewide policy goals. Given the increased integration efforts with other programs, Codes & Standards will work towards informing new EM&V studies that appropriately assess and incent collaboration. The C&S program will also be enhanced to support the building industry in reaching ZNE with a specific emphasis on residential new construction. Refer to the Residential Sector BP for additional details.
2. **State Building Codes Advocacy subprogram:** The C&S Program will expand activities to include building codes that support Integrated Distributed Energy Resource (IDER) goals, systems integration, and clean transportation infrastructure. The State Building Codes Advocacy Subprogram is one of two subprograms to be administered by a program administrator (PA) on behalf of the CPUC PAs.
3. **State Appliance Standards Advocacy subprogram:** The C&S Program will expand activities to address municipal and agricultural water-related energy efficiency and conservation, IDER appliance standards (e.g., performance requirements for smart inverters, DR-enabled products, etc.), and embedded energy opportunities within appliances. These new avenues will contribute to GHG reduction goals as well as EE objectives.

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<sup>1</sup> Background on existing activities for each subprogram are discussed in Section C.a (“Discussion of Opportunities and Near-, Mid-, Long-term Strategies”) and elsewhere throughout the chapter.

4. **Compliance Improvement subprogram:** The C&S Program will expand activities to:
  - Support California Energy Commission 's (CEC) 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.
5. **Reach Codes subprogram.** The C&S program will expand activities to support local governments' increased focus on adopting ordinances requiring measures beyond traditional EE measures. These measures would include: voluntary standards, renewable energy, alternative fuels vehicle infrastructure, energy storage, demand response, and water saving measures.

## **B. Proposed New Subprograms**

### **1. 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.

### **2. Code Readiness Subprogram**

This subprogram is specific to PG&E with much of the same work completed through SCE's C&S Program (under Planning and Coordination and Reach Codes subprograms) and the Emerging Technology Program (ETP), and in conjunction with EE incentives programs, and other internal SCE organizations.

## **II. Market Characterization**

The existing C&S Program affects building energy systems throughout the residential, commercial, and industrial sectors. All projects that include the construction of new buildings, retrofit of existing facilities, or the purchase of most appliances in California are affected by C&S Program activities.

### **A. Customer Landscape**

C&S activities affect many stakeholders in the building industry supply chain. Appliance standards affect all customers who purchase regulated products. Considering this, the influence of C&S has an effect on virtually all customers. With respect to advocacy engagement, the priority stakeholders include those who have the

ability to affect the success of the standard up to and throughout the rulemaking process and then later through implementation. The code development bodies such as the CEC, DOE, ASHRAE, ICC, etc., 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:

**1. Local, State, and Federal Government Agencies**

- Local jurisdictions
- State agencies
- Federal agencies

**2. Utility Colleagues**

- California IOU partner utilities
- Non-California based IOUs operating in California
- California-based municipal utilities
- National utility partners
- Third-party implementers
- Trade professionals

**3. Standards and Ratings Organizations**

**4. Enforcement Agencies**

- Building inspectors
- Building Plan examiners
- Building official advocacy groups

**5. Regional Partnerships and Advocacy Groups**

**6. Construction Industry Market Actors**

- Design professionals
- Contractors
- Engineering firms
- Energy consultants
- HERS raters
- Acceptance test technicians

**7. Construction Industry Suppliers**

- Manufacturers, distributors, and retailers
- Industry associations

**8. End Users**

- Building owners
- Occupants
- Consumers.

## B. Trends

### 1. Increasing CPUC Emphasis on Codes and Standards

During the last several years, the California Public Utilities Commission (Commission) has communicated the importance of codes and standards. D.12-05-015, *for example*, stated the following:

*“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.’ The proposal addresses a perceived gap in current IOU codes and standards programs, namely, the absence of an integrated process for coordinating codes and standards activities throughout all of the IOUs’ programs.”<sup>2</sup>*

*“After considering all the factors impacting the codes and standards program, we are persuaded that the Staff Proposal to create an integrated dynamic approach should be developed. An integrated approach to the codes and standards program addresses the critical need for targeted and collaborative efforts with technology development leading to future codes and standards adoption.”<sup>3</sup>*

In February 2016, the Commission stated the following:

*“One of the largest factors in California’s energy efficiency success story is progressive appliance codes (Title 20) and building codes (Title 24). Every few years, the state issues a new set of rules and regulations that are designed to reduce energy usage while increasing customers’ comfort, safety, and health. The CPUC authorizes the IOUs to advocate for energy saving codes and standards at both the state and federal level. This is because the IOUs are on the front lines of energy savings programs, and are well positioned to advise state agencies to adjust building and appliance codes. The CPUC also authorizes the IOUs and local governments to implement programs that assist builders with building codes implementation and compliance improvement.”<sup>4</sup>*

Figure illustrates the Commission’s prioritization of C&S. The Commission recognizes the role that C must play in achieving state goals and the program is poised to grow to meet the expectation of achieving a positive impact.

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<sup>2</sup> CPUC D.12-05-015, pg. 246.

<sup>3</sup> CPUC D.12-05-015, pg. 249.

<sup>4</sup> CPUC. “Regulating Energy Efficiency: A Primer on the CPUC’s Energy Efficiency Programs.” February 2016. [http://www.cpuc.ca.gov/uploadedFiles/CPUC\\_Public\\_Website/Content/News\\_Room/Fact\\_Sheets/English/Regulating%20Energy%20Efficiency%200216.pdf](http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/News_Room/Fact_Sheets/English/Regulating%20Energy%20Efficiency%200216.pdf).

Figure 1: 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
<ul style="list-style-type: none"> <li>• <b>§ 25402.7. Utility support for building standards</b></li> <li>• (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.</li> </ul>	<ul style="list-style-type: none"> <li>• Expand Titles 24 and 20 to address all significant energy end uses.</li> <li>• Improve coordination of state energy codes and standards with other state and federal regulations.</li> <li>• Greater convergence of C&amp;S and DSM.</li> <li>• Improve code compliance and enforcement.</li> </ul>	<ul style="list-style-type: none"> <li>• Align the development and implementation of regulations, policies, plans, incentives, and codes related to ZNE buildings.</li> <li>• Establish a long-term progressive path towards ZNE Codes &amp; Standards by 2020 (res) and 2030 (nonres).</li> <li>• Lower the threshold for applying codes to existing buildings.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>2009-11 Goals Decision</b></li> <li>• 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.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>2013-14 Portfolio</b></li> <li>• 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."</li> </ul>	<ul style="list-style-type: none"> <li>• Rolling Portfolio Decision re: EE Goals for 2016 and beyond and EE Rolling Portfolio Mechanics</li> <li>• "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"</li> </ul>

### 3. Increasing Number of State Policy Drivers

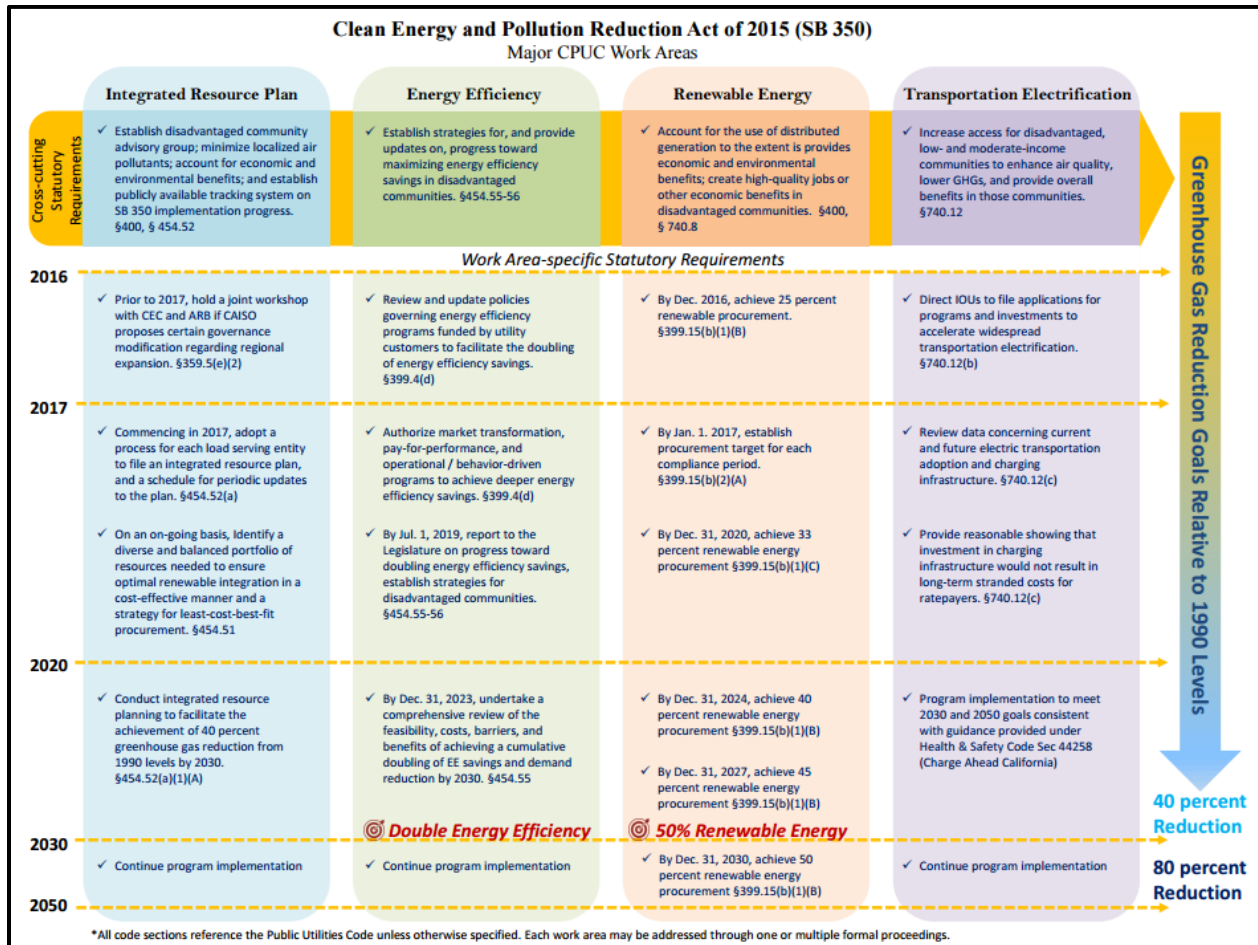
The Commission has indicated that California’s publicly-funded EE programs are an integral part of the State’s fight against climate change and GHG reductions. California has a growing number of energy- and climate-related policy goals, expressed in executive orders, legislative bills, and state agency action plans (see Figure below for selected goals). Statewide goals are diverse in scope, including targets over the next 35 years for EE, demand reduction, renewable energy, onsite generation, grid connectivity, demand response, energy storage capacity, ZNE buildings, water efficiency, and alternative fuels vehicle (see Figure 3).

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Figure 3. Major SB 350 Work Areas for CPUC<sup>6</sup>



#### 4. Increasing Complexity in the Distributed Energy Resource Program Industries

Distributed Energy Resource (DER) program infrastructure has become increasingly complex, particularly in California.<sup>7</sup> As standards are created or advanced that touch more industries and stakeholders, the landscape of agencies involved in standards development, adoption, and compliance support also grows. Once vertically integrated business largely administered and implemented by the IOUs, the DER industry now includes third-party implementers, government partnerships, Regional Energy Networks (RENs), Community Choice

<sup>6</sup> <http://www.cpuc.ca.gov/sb350/>

<sup>7</sup> The CPUC organizes the DER programs into the following sections: Alternative Fueled Vehicles, California Solar Initiative (CSI), Demand Response, Energy Efficiency, Integrated Distributed Energy Resources, Net Energy Metering, Self-Generation Incentive Program, and Water/Energy Nexus Programs. (See [http://www.cpuc.ca.gov/Demand\\_Side/](http://www.cpuc.ca.gov/Demand_Side/).) Since 2007, the CPUC has sought to integrate demand side energy solutions and technologies through utility programs offerings. D.07-10-032 directed that utilities "Integrate customer demand-side programs, such as energy efficiency, self-generation, advanced metering, and demand response, in a coherent and efficient manner."

Aggregators (CCAs), and DR aggregators. As complexity increases, so do the resources needed to coordinate.

### **5. Regulatory Agency Influence**

The rate and level of stringency at which the CEC and DOE develop and update their codes are subject to various influencing factors, such as state and federal policy goals, government administration, etc. Over the past several years, this has fluctuated widely; especially with the DOE. Because the volume of codes and standards updates are difficult to predict, the C&S Program's energy savings, demand reduction, and required resources are also difficult to predict. Also, state and local code development often tends to surge during periods of decreased federal activity (e.g., DOE appliance standards).

### **6. Increasing Rigor for Code Change Proposals**

As concerns from industry stakeholder groups increases, in particular during CEC rulemakings, the IOUs are required to provide more rigor for code change proposals. For example, it is now common for building or manufacturing industries to be more demanding of data underlying cost or benefits calculations; in turn, the CEC is requesting more data from the IOUs that come from field or market studies, lab tests, tear-down analyses, costs data from the Web, etc. Amenity and human response to physical attributes, and how people operate buildings and equipment, are also increasingly considered during CEC rulemakings.<sup>8</sup> Solid and verifiable qualitative analysis is needed to respond to these needs as well.

### **7. Focus on Existing Buildings**

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. Adversely, 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 industry have pushed back against this perceived expansion citing cost barriers and frustrations with code complexity.

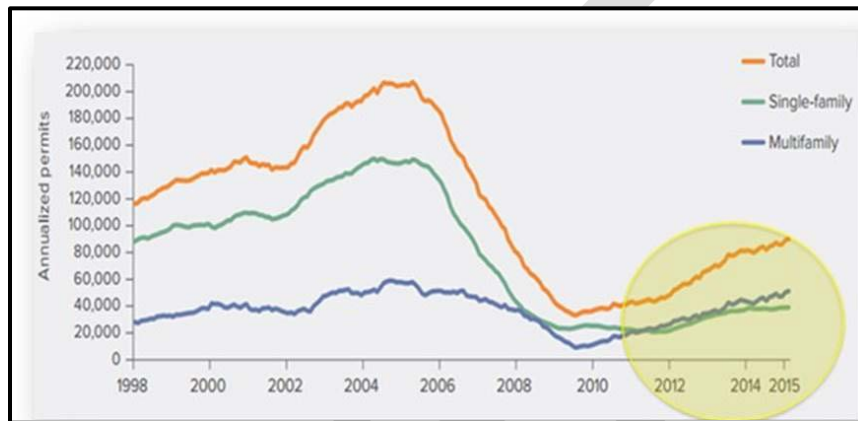
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<sup>8</sup> For a more in depth discussion, see *Codes and Standards: A Path to Affordable Amenity and Customer Satisfaction*, Jon McHugh, Alex Chase, Gary Fernstrom, Mike McGaraghan, Chad Worth, and Pat Eilert and the 2016 ACEEE Summer Study on Energy Efficiency in Buildings Proceedings, August 2016.

### 8. Multifamily Buildings

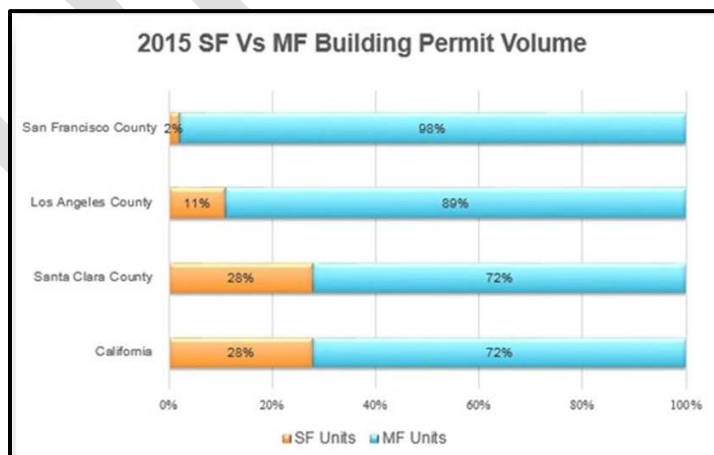
The low-rise multi-family sector presents both opportunities and challenges in achieving ZNE by 2020. Approximately one-third of housing in California is estimated to be multi-family households. Over the last decade, the proportion of multi-family housing has been increasing with new multi-family permits representing over 50 percent of all permits beginning in 2012. Between 2012 and 2015, new multi-family permits rapidly increased to represent 72 percent of all residential permits issued in California.<sup>9</sup>

**Figure 3. Multifamily Permits 1998-2015**



Fueled by strong rental demand, multi-family permits represented 89 percent of all residential permits issued in Los Angeles County.<sup>10</sup> In San Francisco County, multi-family permits represented 98 percent of all residential permits.<sup>11</sup>

**Figure 4. 2015 MF Building Permit Volume**



<sup>9</sup> CITE.

<sup>10</sup> CITE.

<sup>11</sup> CITE.

Multi-family starts are expected to remain a significant portion of new construction due to increasing market demand and state public policy encouraging urban infill development at higher building densities located near transit corridors.

## **C. Gaps/Barriers**

### **1. Conflicting Policy or Gaps in Policy**

Although California has a forward-thinking energy policy framework, there are conflicts that may constrain the C&S Program from supporting the achievement of these goals. There is also legislation that gets passed without adequate implementation plans that identify funding mechanisms, timelines that align with other policies, and a way to measure results. For example, the ZNE goals stated in the CLTEESP do not fully align with the GHG reduction goals of AB 32 in terms of metrics, measurement, and milestones. The ZNE goals also do not align with policies that direct focus on DERs and the respective evolution of the energy grid. Lastly, while the CEC's building energy standards (Title 24, Part 6) accommodates a robust set of integrated building requirements for energy savings, renewable generation, and energy storage/demand response; IOU advocacy efforts are hindered because many of these requirements are litigated in separate CPUC proceedings, which can cause timing and policy misalignments.<sup>12</sup>

### **2. 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 EPA Act 2005, California could no longer update standards beyond federally adopted efficiency criteria for commercial clothes washers.<sup>13</sup> Federal law includes an option for states to petition DOE for a preemption waiver, but no state has successfully done so and it is not considered a practical option.<sup>14</sup> 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

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<sup>12</sup> R.13-09-011 DR OIR, R.15-03-011 Energy Storage, R.13-12-010 LTPP.

<sup>13</sup> CITE.

<sup>14</sup> CITE.

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.<sup>15</sup>

### **3. Miscellaneous Electrical Loads**

To achieve ZNE in California, special attention must be given to miscellaneous electrical loads (MELs) and plug-in electric vehicles (PEV). Many types of MELs have a relatively shorter product cycle (e.g., cell phones, tablets, smart watches, etc.). ENERGY STAR<sup>®</sup> and various voluntary standards at the national level, even though they cannot be fully enforced, are potential paths for establishing energy savings. This type of new approach will require some policy changes, including EM&V methods.

### **4. Recognized Need for Fully Integrated Distributed Energy Resources**

Achieving ZNE for new and existing buildings and maintaining T&D grid stability requires demand flexibility through the integration of various systems in buildings and communities, such as:

- Implementation of precooling and preheating
- Expansion of demand response (for reliability, overgeneration, and economic benefits)
- Implementation of alternative fuels and EV infrastructures, and
- Integration of photovoltaic (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.

### **5. 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 to where they are ready to be 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.<sup>16</sup> 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-

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<sup>15</sup> DOE. Accessed September 10, 2016. <http://energy.gov/eere/buildings/appliance-and-equipment-standards-program>.

<sup>16</sup> CITE.



making process collected through laboratory testing, field surveys, and demonstrations will help fill data shortfalls.

## **6. 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 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.

## **7. Multi-family Buildings**

Multi-family housing has many sub-types that make it more challenging to address as a single sector with regard to building standards. Multi-family 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 multi-family building construction is covered by residential building standards similar to single family residential. Given the energy use intensities associated with multi-family, 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 multifamily building energy standards to address the specific energy use characteristics associated with low-rise and high-rise multi-family projects.

# **III. Benefits of C&S Program**

## **A. Roles for Codes & Standards Program within the Cross-Cutting Sector**

The C&S Program serves a diverse customer landscape, and plays a cross-cutting role in supporting Residential, Commercial, 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 is working 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.

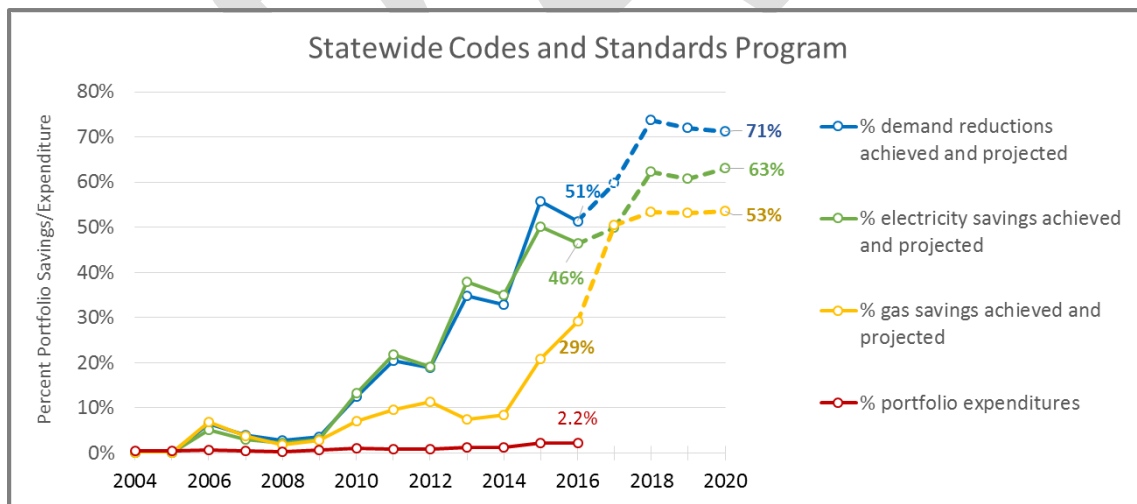
## B. C&S Support for the EE Portfolio

The C&S Program is an extremely cost-effective program. Savings continue to accrue for many years following C&S Program advocacy activities. In 2016, with a budget equal to approximately 2.2 percent of the portfolio total, the C&S Program will generate approximately half of the portfolio electric savings (46 percent electricity, 51 percent demand) and almost one-third (29 percent) of gas savings.<sup>17</sup>

The program timeline results in advocacy efforts being conducted several years prior to realizing the savings. The savings shown in Figure 1 show that measures adopted because of C&S Program efforts conducted through March 2016 will continue to produce 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.

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**Figure 1:**  
**Codes and Standards Program Budget and Savings in Context<sup>18</sup>**



<sup>17</sup> CITE.

<sup>18</sup> 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



### **C. Benefits to Customers**

The Statewide C&S Program helps California's customers save energy by:

- Achieving progress toward CPUC, CEC and CARB policy goals
- Reductions in energy bills<sup>19</sup>
- Coordinating with other IOU programs and entities to support the state's energy policy goals
- Providing a solution for the "split incentive" problem faced by a larger percentage of customers who are tenants. (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.);
- 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 Community and Economic 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. 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. Impacts from these market changes provide significant benefits to both IOU and non-IOU customers throughout the state. This benefit affects those who participate in IOU incentive programs as well as those who do not. The CEC estimates that savings from implementation of the 2016 building standards will reduce annual statewide GHG emissions by 160,000 metric tons of CO<sub>2</sub>e<sup>20</sup>.

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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.

<sup>19</sup> 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 Stage 2 Statewide C&S presentation for the EE Coordinating Council.

[http://media.wix.com/ugd/0c9650\\_7b6b1a4581114c73b658ca50b37ba625.pdf](http://media.wix.com/ugd/0c9650_7b6b1a4581114c73b658ca50b37ba625.pdf)

<sup>20</sup> 2016 Building Energy Efficiency Standards, June 2015. <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.

## IV. Vision

### A. C&S 2.0 Changes

C&S 2.0 incorporates four significant changes to the existing program:

- **First**, the planning and coordination subprogram will be expanded to support portfolio planning efforts aimed at state policy goals and grid integration.
- **Second**, 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.
- **Third**, the scope of the C&S Program will aim to expand the inclusion of IDER (*e.g.*, EE, demand response, renewables, energy storage, etc.) 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.).
- **Fourth**, 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 CPUC Decision 12-05-015.<sup>21</sup>

### B. Discussion of Opportunities & Near-, Mid-, & 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.

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<sup>21</sup> D.12-05-015, p. 246.

## 1. 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.<sup>22</sup> In 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 “code readiness” priorities for the building and appliance code advocacy programs specifically.

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<sup>23</sup> that integrates an ever-growing set of DERs and technologies that include demand response, electric vehicle infrastructure, photovoltaic systems, and battery energy storage.

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 1. Planning and Coordination Subprogram Strategies and Tactics**

<b>Planning and Coordination Subprogram Objectives/Outcomes:</b>			
<ol style="list-style-type: none"> <li>1. Support strategic planning activities with state agency stakeholders to assist implementation of specific state energy-efficiency policy goals.</li> <li>2. Support strategic planning activities with grid and DER stakeholders to facilitate development of a “plug and play” grid that is safe and reliable.</li> <li>3. Lead strategic planning activities within the EE portfolio to identify synergistic priorities for the building and appliance code advocacy programs.</li> </ol>			
<b>Tactics</b>	<b>New or Modified Tactic?</b>	<b>Objective</b>	<b>Near-term = 1-2 yr. Mid-term = 3-6 yr. Long-term = 5-15 yr.</b>
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 transmission and distribution 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

<sup>22</sup> CITE.

<sup>23</sup> The Emerging Clean Energy Economy, 2016.

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
<b>Cross-Cutting Sectors:</b>			
<ul style="list-style-type: none"> <li>• Residential</li> <li>• Commercial</li> <li>• Public</li> </ul>			
<b>Partners:<sup>24</sup></b>			
<ul style="list-style-type: none"> <li>• Other programs within the EE portfolio</li> <li>• Other internal groups outside EE portfolio: distribution, transmission, distributed generation, electric vehicles, demand response, storage, etc.</li> <li>• Agencies and code-setting entities: CPUC, CEC, CARB, DOE, ASHRAE, ICC</li> <li>• Municipal utilities and organizations: SMUD, LADWP, SCPPA, NCPA</li> <li>• External progressive utilities and other entities: NEEA, National Grid, Arizona Public Service, West Coast Collaborative, etc.</li> <li>• Water agencies</li> <li>• Residential single-family and multi-family home builders</li> </ul>			

## 2. State Building Codes Advocacy Subprogram

**Background.** The State Building Codes Advocacy Subprogram is one of two subprograms to be administered by a PA on behalf of the CPUC PAs. Through the 2005, 2008, 2013, and 2016 Title 24 building code cycles, the program successfully advocated for 114 building regulations, including building envelope, mechanical systems, lighting systems, and process loads.<sup>25</sup> The subprogram is currently developing proposals in support of the CEC’s 2019 Title 24 building energy standard update. Engagement in previous code cycles and long-term experience is a significant benefit to this work given the need to anticipate areas of interest by code setting bodies, code complexity, and a need for continuity. For example, a deep understanding of the details in previous code cycles informs the next cycle and reduces the investment in developing new measures. In recent years, Publicly Owned Utilities have become increasingly interested in partnering with IOUs to develop code change proposals, and we welcome their involvement.

<sup>24</sup> The C&S program team engages with many different stakeholders and partners. Thus, the “Partners” section within each subprogram table is non-exhaustive.

<sup>25</sup> **CITE.**

**Table 2. State Building Codes Advocacy Subprogram Strategies and Tactics**

<b>State Building Codes Advocacy Objective/Outcomes:</b>
1. Lead the development of the highest quality code change proposals that resources allow to maximize the energy savings impacts of new codes adopted by California’s code setting bodies, including the CEC, HCD, and Building Standards Commission.
2. Provide well-supported, data-driven codes and standards enhancement (CASE) reports that provide justification for proposed measures based on criteria defined by the Warren-Alquist Act.
3. Advocate for significant increases in the scope and stringency of building codes in support of California’s policy goals, which include both existing buildings and new construction.
4. Increase collaboration with stakeholders to facilitate acceptance of new standards before their effective date.
5. Lead the development of new alliances to create and support code change proposals.
6. Achieve significant reductions in customer energy and water use.

<b>Tactics</b>	<b>New, Existing or Modified Tactic?</b>	<b>Near-, Mid-, or Long-Term?</b>	<b>Objective Number(s) Addressed</b>
Lead the creation of detailed CASE proposals for agreed upon topics of interest to the CEC and other code setting bodies.	Mod	Near-, Mid-, and Long-Term	1,2,3
Lead the development of a roadmap that examines future code cycle opportunities to meet long-term policy goals.	New	Long-Term	1,6
Increase market analyses and gather high-quality data to inform code change proposals. <sup>26</sup> Addresses Objective 2	Mod	Near-Term	
Support expansions in the scope of standards to increase savings, for example, in standards that will cover new process loads and building types.	New	Near & Mid	3,6
Provide support to the HCD to develop or enhance measures in CALGreen to harmonize with Title 24, Part 6. Measures may include water use, building materials, ventilation and source pollutants.	New	Near, Mid, & Long	5
Support the harmonization of measures in Title 20 with Title 24, Part 6, as well as other relevant appliance codes.	Mod	Near, Mid, & Long	1,5
Support the adaptation of Title 24, Part 6 to better address multi-family and mixed use building types.	New	Near & Mid	2
Participate in the ASHRAE and ICC code development and update processes to increase alignment with Title 24, Part 6 and support future Title 24 updates.	Continue	Near, Mid, & Long	3
Support productive relationships with Publicly Owned Utilities, EE advocacy groups and industry representatives to facilitate problem solving during rulemaking proceedings.	Continue	N/A	4,5
Support the updating of performance approach tools to model how building standards will support state policies aimed at zero net energy buildings.	Mod	Near	6

<sup>26</sup> Research may include a variety of activities: field surveys to collect population data; collection of internet data to determine costs, availability, performance, and compliance; tactical surveys on specific technologies, industries, markets, behavior, and satisfaction; lab tests, etc. Research will be conducted in coordination with ETP, EMV, along with multiple C&S subprograms.

Tactics	New, Existing or Modified Tactic?	Near-, Mid-, or Long-Term?	Objective Number(s) Addressed
In collaboration with other sectors and subprograms (Compliance Improvement), improve compliance tracking methods to increase compliance with building codes and to inform future code updates.	New	Near, Mid, and Long	4
<b>Partners:</b>			
<ul style="list-style-type: none"> <li>Code-setting entities: CEC, Building Standards Commission, HCD, California Air Resources Board</li> <li>Sectors: Residential, Commercial, Industrial, Public</li> <li>IOU Internal Programs: Emerging Technologies Program (ETP), Programs, Local Government Partnerships (LGP), ZNE, DR</li> <li>Code enforcement community members (CALBO, CSLB)</li> <li>National Building Code Development Entities: ICC, ASHRAE, IAPMO, NFPA</li> <li>Standards Setting entities: ASHRAE, ICC IES, ASTM, ENERGYSTAR, IAPMO</li> <li>Manufacturing community representatives</li> <li>Design and construction community members</li> <li>Municipal utilities: SMUD, LADWP</li> <li>Compliance software developers</li> <li>Simulation software developers (<i>for example</i>, DOE EnergyPlus developers: DOE, NREL, LBNL)</li> </ul>			

### 3. State Appliance Standards Advocacy Subprogram

**Background.** The California Appliance Standards Subprogram is one of two statewide subprograms to be administered by a single IOU on behalf of PAs. Since 2005, the statewide C&S Program has advocated for 54 Title 20 California appliance standards through adoption, with several new standards proposals under development. Similar to other areas of advocacy, the greatest need is to increase the quality of data in response to demands by the CEC for increasing rigor.

**Table 3. State Appliance Standards Advocacy Subprogram Strategies and Tactics**

<b>State Appliance Standards Advocacy Subprogram Objectives:</b>			
1. Lead the highest quality advocacy that resources allow to maximize impact from standards proposed by the CEC.			
2. Support significant increases in the scope and stringency of appliance standards in support of California’s policy goals.			
<b>State Appliance Standards Advocacy Subprogram Outcome:</b>			
1. Significant reductions in customer energy and water usage. (outcome)			
Tactics	New, Existing or Modified Tactic?	Near, Mid or Long-term?	Objective Number(s) Addressed
Lead detailed CASE proposals for all topics of interest to the Energy Commission.	Existing	Near, Mid, & Long	1, 2
Provide market analysis and gather high-quality data to inform code change proposals.	Mod	Mid	1



Proactively engage and foster improved working relationships with industry representatives to CEC rulemakings.	New	Mid	1, 2
Collaborate with POUs to support new proposals.	New	Mid	1, 2
Proactively enhance regulations to include DR requirements, grid connectivity, etc.	New	Mid	1, 2
Continue leveraging expertise and knowledge from other EE advocates (CLTC, NEEA, NRDC, etc.).	Continue	Near	1, 2
<b>Partners:</b>			
<ul style="list-style-type: none"> <li>• Code-setting entities: CEC, California Building Standards Commission</li> <li>• Sectors: Commercial, Residential, Industrial, Public, Agricultural</li> <li>• IOU Internal Programs: Emerging Technologies Program, Demand Response, Incentive Programs, Zero Net Energy Programs and Workforce Education &amp; Training</li> <li>• IOU Statewide C&amp;S Team</li> <li>• State and Local governments</li> <li>• Manufacturing community stakeholders</li> <li>• EE and DR advocates</li> </ul>			

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#### **4. National and International Standards<sup>27</sup>**

**Background.** Since 2005, the California IOUs have advocated 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.<sup>28</sup> 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

<sup>27</sup> Proposed new dedicated subprogram, separate from new formalized “statewide” programs. (In August 2016, CPUC Decision 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.)

<sup>28</sup> DOE, accessed September 10, 2016. <http://energy.gov/eere/buildings/appliance-and-equipment-standards-program>. Values are national estimates.

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 impact California customers and goals.<sup>29</sup>

**Table 4. National and International Standards Subprogram Strategies and Tactics**

<b>National and International Standards Subprogram Objectives:</b>
<ol style="list-style-type: none"> <li>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 (<i>for example</i>, DOE, ASHRAE, ICC, EPA, USGBC, CHPS, IEC, etc.)</li> <li>2. Support significant increases in the scope and stringency of national regulations and standards that support California’s policy goals.</li> </ol>
<b>National &amp; International Standards Subprogram Outcomes:</b>
<ol style="list-style-type: none"> <li>1. Reductions in customer energy and water usage.</li> </ol>

Tactics	New, Existing or Modified Tactic?	Near-, Mid- or Long-Term?	Objective Number(s) Addressed
Influence code development proceedings (e.g., 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/ demand response 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
Lead collaboration with national industry associations, labs, and EE/ demand response 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 (e.g., ASHRAE 90.1 and IECC) reach codes (e.g., 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,	Mod	Near, Mid	1

<sup>29</sup> 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 Environmental Protection Agency (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.



Tactics	New, Existing or Modified Tactic?	Near-, Mid- or Long-Term?	Objective Number(s) Addressed
EPA/ENERGY STAR, etc.), and regulatory agencies (DOE, ICC, etc.).			
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
<b>Partners:</b>			
<ul style="list-style-type: none"> <li>• Codes and standards setting entities</li> <li>• Sectors: Commercial, Residential, Industrial, Public, Agriculture</li> <li>• IOU Internal Programs: Emerging Technologies Program, Demand Response, Incentive Programs, Zero Net Energy Programs and Workforce Education &amp; Training</li> <li>• IOU Statewide C&amp;S Team</li> <li>• EE and DR advocates</li> <li>• Manufacturing community and Industry groups Construction &amp; Design Community</li> </ul>			

**5. 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 ensuring that potential savings from C&S are 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 5. Compliance Improvement Subprogram Strategies and Tactics**

<b>Compliance Improvement Objectives/Outcomes:</b>
<ol style="list-style-type: none"> <li>1. Lead the continuous improvement of compliance with building and appliance efficiency standards to help realize the full potential of adopted standards.</li> <li>2. Support various market actors in the compliance supply chain to understand their unique role in compliance, and equip each with the specific knowledge, skill, and tools they need to quickly, easily and effectively perform their compliance job tasks.</li> <li>3. Support the development of successful standards by helping CASE authors address code implementation during the code development (advocacy) process.</li> <li>4. Lead monitoring and reporting on compliance with building and appliance efficiency standards.</li> </ol>

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Tactics	New, Existing or Modified Tactic?	Near-, Mid-, or Long-Term?	Objective Number(s) 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
Tactics	New, Existing or Modified Tactic?	Near-, Mid-, or Long-Term?	Objective Number(s) Addressed
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
<b>Partners:</b>			
<ul style="list-style-type: none"> <li>• Code-setting entities: CEC, HCD, BSC</li> <li>• Sectors: Residential, Industrial, Commercial, Public, Cross Cutting</li> <li>• Other state agencies</li> <li>• Investor Owner Utilities: IOU Statewide C&amp;S Team, Programs, WE&amp;T, DR, Local Government Partnerships</li> <li>• Utilities: POUs and water districts</li> </ul>			

- Code enforcement community
- Design, construction, energy consultant community members
- Manufacturing community representatives
- State and local governments
- Regional Energy Networks
- Research community members
- California's higher education institutions
- Energy and sustainability non-profit organizations

### 6. 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”<sup>30</sup> CAL Green Energy Efficiency Tiers such as exceeding base code by 15%, mandate “prescriptive”<sup>31</sup> EE measures such as cool roofs, and/or require “renewable energy”<sup>32</sup> installation such as solar PV. State law<sup>33</sup> requires that “local governmental agencies wishing to enforce locally adopted energy conservation standards” shall submit a study with supporting analysis to the CEC showing how the local government determined energy savings and cost effectiveness.

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.

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<sup>30</sup> CAL Green (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.

<sup>31</sup> 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.

<sup>32</sup> Mandating installation of renewable energy measures does not necessarily require following California’s Preferred Loading Order: energy efficiency, demand response, renewables, and distributed generation.

<sup>33</sup> Section 10-106 of the California Code of Regulations, Title 24, Part 1, Article 1

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, demand response, and water saving measures.

**Table 6. Reach Codes Subprogram Strategies and Tactics**

<b>Reach Codes Subprogram Objectives/Outcomes:</b>
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, electric vehicle infrastructure, energy storage, demand response, 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.
4. Lead strategic planning activities within the EE portfolio to identify “code readiness” priorities for the building and appliance code advocacy programs.

<b>Tactics</b>	<b>New or Modified Tactic?</b>	<b>Objective Number(s) Addressed</b>	<b>Near-term = 1-2 yr. Mid-term = 3-6 yr. Long-term = 5-15 yr.</b>
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 CAL Green Voluntary Tiers as a primary source for reach code measures by preparing cost effectiveness studies that support the CAL Green 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, electric vehicle infrastructure, energy storage, demand response, 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 integrated distributed energy resources (IDER) components.	New	3	Long-term

Tactics	New or Modified Tactic?	Objective Number(s) Addressed	Near-term = 1-2 yr. Mid-term = 3-6 yr. Long-term = 5-15 yr.
Identify strategies for mitigating potentially adverse impacts on the local distribution grid (especially aged infrastructure areas) including tariffs, net energy metering, and interconnection regulation.			
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
<b>Partners:</b>			
<ul style="list-style-type: none"> <li>• Code-setting entities: CEC</li> <li>• Sectors: Public, Commercial, Residential</li> <li>• IOU Internal Programs: Local Government Partnership Program</li> <li>• State and local governments</li> <li>• Code enforcement community</li> <li>• IOU Statewide C&amp;S Team</li> </ul>			

## V. Metrics

### A. Regulatory 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 primary indicators of success in the building-related subprograms includes following the timeline set forth by California policy to reach milestones on the pathway to ZNE. The CEC makes the final decision as to what criteria constitutes success, and it is the goal of C&S to offer in-depth support to the CEC in this process.

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.

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Table 7. Codes and Standards Metrics

Problem Statement	Desired Market Effects	Intervention Strategies	Market Effect Metrics	Baseline	Metric Data Source	1–3 years (2017–2019)	4–7 years (2020–2023)	8–10 years
How can the ambitious state EE goals be achieved?	Strategically planned solutions (technology packages) to achieving state policy goals are adopted into standards based on increased market acceptance and available data needed for standard advocacy.	Organize C&S, ETP, and incentive programs efforts to increase market adoption and overcome barriers to C&S adoption of strategic solutions to achieving state policy goals.	Percent of state policy goals covered by the planned C&S efforts; Milestones set by C&S plans	Existing standards, prevailing market practice	Percentage of state policy goals covered will come from program tracking data	Aggregated schedules and milestones of all C&S plans that align with the schedules of policy goals and C&S rulemaking. Included policy goals include those contained in the California Long Term Energy Efficiency Strategic Plan which include ZNE goals residential and commercial new construction		
How can the Statewide C&S Program help to maximize EE portfolio savings & cost-effectiveness?	Cost effective measures developed through expanded C&S advocacy efforts are adopted into state and federal standards.	Through C&S program planning and coordination, expand advocacy of CA building codes, CA appliance standards, and national regulations and standards; compliance improvement, reach code development efforts.	Energy savings of proposed CASE studies and scheduled DOE appliance standard updates Impact on EE portfolio cost effectiveness	Energy savings from adopted standards, or CPUC 2015 potential study, or baseline used by CPUC C&S program impact evaluation	<ul style="list-style-type: none"> <li>• CPUC potential study forecast</li> <li>• C&amp;S planning forecast and tracking</li> <li>• CPUC impact evaluation</li> </ul>	TBD		
How can the Statewide C&S Program help California achieve its statewide GHG reductions targets?	All cost effective, feasible, and available measures developed through expanded C&S advocacy efforts are adopted into standards by state and federal agencies.	Expand C&S program advocacy to address standards related to integrated resource planning, such as DR, DG, storage, transportation electrification and other opportunities — for example, low-GWP refrigerants and water efficiency.	Number of standards developed GHG emission reduction	Common market practices	C&S planning forecast and tracking	Suggest no targets, because these are not 100% in C&S's control. This should just be a tracking metric.	N/A: Tracking metric	N/A: Tracking metric

<b>Problem Statement</b>	<b>Desired Market Effects</b>	<b>Intervention Strategies</b>	<b>Market Effect Metrics</b>	<b>Baseline</b>	<b>Metric Data Source</b>	<b>1–3 years (2017–2019)</b>	<b>4–7 years (2020–2023)</b>	<b>8–10 years</b>
As the need to accelerate code adoption increases how can local, bottom-up support be provided	Increase adoption of local reach codes that can support development and adoption of statewide and national code changes.	Reach Code Strategy	<p>Number of jurisdictions adopting reach codes.</p> <p>Number of jurisdictions that are aware of GHG benefits of reach codes.</p>	<p>Number of jurisdictions by 12/31/2017 that have adopted reach codes.</p> <p>Average annual number of jurisdictions presented with information and support for reach code development from 2015–17.</p>	Program tracking	To be proposed after baseline developed		

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## **VI. Program / Program Administrator (PA) Coordination**

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), Products and Programs staff 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 program administrator. An IOU advisory group will support these two subprograms and provide guidance to the lead administrator. This program has historically been one of the most successful statewide programs over the past 15 years. Ensuring its ongoing efforts in light of the changes is critical for long term success.

## **VII. EM&V Considerations**

EM&V activities supporting the C&S Program serve three distinct needs:

1. Detailed baseline data collection forms the basis for support of federal and State standards development. Standards development is grounded in a firm understanding of existing conditions of energy use by appliance, system, and market segment. Without current appliance / equipment usage information by market segment, credible estimates of standard savings, lifecycle cost, and prospective cost-effectiveness, it is difficult to present a persuasive case for adoption of a proposed standard. Large, statistically valid samples of customer-specific appliance holdings, building conditions, and consumption patterns are needed to establish the appropriate scope and level of a proposed standard. These efforts demand carefully designed and adhered to sampling plans, extensive on-site survey efforts, and energy use metering at both the appliance / system and whole building levels. The sample designs must be sufficiently robust to allow testing of potential efficiency changes to support the standard development process.

The detailed baseline data collection efforts are also critical in the examination and characterization of compliance issues that have arisen with current standards. This is essential so as to not create similar compliance issues as standards are ratcheted upward.

Because they are integral to program implementation, all of these baseline data collection efforts employ C&S Program dollars, not EM&V dollars. They are

considered part of the program implementation process, but should be coordinated with the EM&V staff to further transparency and avoid overlap.

2. Development and tracking of program metrics to gauge sub-program effectiveness is essential to continued improvement of program implementation efforts. Advocacy efforts are the key driver of readily measurable energy savings for the C&S Program. Rigorous recording and detailing of IOU advocacy efforts is essential in order to determine the relative impact of IOU efforts on passage of new codes and standards. Such information, gathered as part of program implementation efforts, is used in the preparation of Code Change Theory Reports (CCTRs) that form the basis for program attribution determination by CPUC impact consultants.

The use of program metrics is also important in determining the effectiveness of C&S Program efforts for which direct energy savings information is not readily available. Compliance Improvement efforts, for example, are not easily measured by changes in program savings due to the cost of obtaining detailed compliance data. In particular, building standards compliance data is notoriously costly to obtain. Hence, program efforts are measured by a variety of non-savings metrics that track the effectiveness of compliance improvement / education efforts.

Non-resource metrics are also necessary to track the reach code support efforts that comprise the IOUs' Reach Code subprogram. While reach codes do generate direct savings the IOU efforts are aimed at providing tools for local jurisdictions to implement reach codes. It is up to the jurisdictions to use the tools as part of their enforcement efforts.

Non-resource program metrics will also be needed to track code readiness subprogram efforts. The intent of code readiness efforts is to accelerate the market transformation effects of C&S Program efforts, rather than directly generating large amounts of near-term savings. Consequently a set of new program metrics will need to be developed to track code readiness efforts and effectiveness.

3. Preparation of materials to aid Energy Division (ED) evaluation of CDMT efforts
  - CCTRs aide net impact determination by ED consultants and establish program activity and code change attribution documentation. CCTRs provide verification of code change logic models and provide insight into the effectiveness of various code advocacy efforts. They play a historical and on-going role in determining savings attributable to IOU program efforts.
  - Potential study support to help the Commission appropriately allocate future EE budgets
    - Codes and Standards studies, as funded from EE EM&V and documented in the EM&V Plan (now Version 6), support program development and provide insight into future opportunities for successful code advocacy.
    - Notable 2010–2012 IOU-led studies included: 1) a Statewide C&S Program Process Evaluation, which investigated implementation and

documentation of Title 20 and 24 advocacy and CASE studies, 2) an Incremental Measure Cost analysis to examine the decline of Title 20 Appliance products costs and update forecasting methods, and 3) a policy thought paper to determine the baselines for building alterations.

- Notable 2013–2014 IOU-led studies have included 1) an assessment of savings overlaps from interactive effects currently unaccounted for in CASE studies, and 2) analyses of 2008 Title 24 nonresidential compliance audits.
- Planned 2015 IOU-led studies include studies to 1) determine code readiness, 2) explore methods for Title 24 improvement, and 3) conduct a process evaluation of IOU C&S Program trainings, classes, and tools.

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## VIII. Appendix

### A. Abbreviations and Acronyms

ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ACEEE	American Council for an Energy-Efficient Economy
C&S	Codes and Standards
CALBO	California Association of Building Officials
CARB	California Air Resource Board
CBSC	California Building Standards Commission
CCTR	Code Change Theory Report
CEC	California Energy Commission
CLTEESP	California Long Term Energy Efficiency Strategic Plan
CO <sub>2</sub> e	Carbon dioxide equivalent
CPUC	California Public Utilities Commission
DER	Distributed Energy Resources
DOE	United States Department of Energy
DR	Demand Response
ED	Energy Division
EE	Energy Efficiency
EM&V	Evaluation Measurement & Verification
EPAct 2005	Energy Policy Act of 2005
EPCA	Energy Policy and Conservation Act
EPIC	Electric Program Investment Charge
ET, ETP	Emerging Technologies, Emerging Technologies Program
GHG	Greenhouse gases
Green MLS	Green Multiple Listing Service
GWP	Global warming potential
HERS	Home Energy Rating System
HCD	Department of Housing and Community Development
HFC	Hydrofluorocarbons
ICC	International Code Council
IDER	Integrated Distributed Energy Resources
IECC	International Energy Conservation Code
IOU	Investor Owned Utility
LADWP	Los Angeles Department of Water and Power
NEEA	Northwest Energy Efficiency Alliance
NEEP	Northeast Energy Efficiency Partnerships
NOMAD	Naturally Occurring Market Transformation
NRDC	National Resources Defense Council
PA	Program Administrator
RASS	Residential Appliance Saturation Study
RCx	Retro-commissioning
RPS	Renewable Portfolio Standard
REN	Regional Energy Network
SB	Senate Bill
SMUD	Sacramento Municipal Utility District
T&D	Transmission & Distribution
TDV	Time Dependent Valuation
TRC	Total Resource Cost Test
US DOE	United States Department of Energy – US may not be used
US EPA	United States Environmental Protection Agency – US may not be used
US FTC	United States Federal Trade Commission – US may not be used
ZNE	Zero Net Energy
ZEV	Zero Emission Vehicles

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