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2010–2012 California Statewide Codes and Standards Program Process Evaluation Final Report

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We have made every effort to accurately document, report, and analyze the information provided by the interviewees and from the range of written materials we reviewed. Any errors or omissions, of course, are the sole responsibility of the authors.

1. Executive Summary

Introduction

Southern California Edison (SCE) and Pacific Gas & Electric (PG&E) contracted with The Cadmus Group, Inc., to perform a process evaluation of the California Investor Owned Utilities' (IOUs) Codes and Standards Program (C&S Program or the Program) for the 2010–2012 program cycle. This evaluation covers the following C&S Program subprograms:

- Building Codes: Title 24 Advocacy, Codes and Standards Enhancement (CASE) Studies, Extension of Advocacy
- Appliance Standards: Title 20 Advocacy, CASE Studies, Extension of Advocacy
- Appliance Standards: Federal Standards Advocacy

The California Energy Commission (CEC) has the responsibility and authority to adopt both building energy-efficiency codes (Title 24) and appliance efficiency standards (Title 20). In recent years, California's IOUs have become active players in the adoption process, advocating for measures to target and providing technical and market background to inform the process. In the 2006–2008 program cycle, the California Public Utilities Commission (CPUC) allowed the IOUs, for the first time, to claim energy savings for their efforts to advance codes and standards. During the 2010–2012 cycle, IOUs also will be allowed to include the Program in the eventual risk/reward mechanism implemented by the CPUC. Recently, the IOUs' activities have extended beyond advocating for codes and standards adoption to supporting other subprogram activities intended to enhance energy savings from codes and standards.

The IOUs view the C&S Program as a key step in a cycle of diffusion of energy-efficient technologies and practices, involving multiple players and program types, and are seen ideally as an integrated suite of programs including Emerging Technologies and voluntary Energy-Efficiency programs. However, as these programs often capture only a portion of the potential energy savings in the market, the IOUs view market intervention through codes and standards as essential to maximizing energy-efficiency opportunities.

Given that the C&S Program likely represents the single largest source of energy savings in the utilities' portfolio, providing reliable feedback now through this process evaluation is both timely and critical. Process evaluation objectives include:

- Document operations;
- Compare the Program and subprogram designs to their implementation;
- Perform qualitative evaluations of Program and subprogram activities;
- Identify implementation challenges; and
- Assess opportunities to increase C&S Program efficiency and effectiveness.

Findings

We used both secondary data and primary data to inform this evaluation. Our research comprised (1) reviews and assessments of key written materials and (2) conduct and analysis of interviews with a diverse set of stakeholders. Findings are summarized here in several key areas targeted by our research design.

Documentation

Code Change Theory Reports (CCTRs) are prepared by the IOUs to document their role in the codes and standards adoption process and assist the impact evaluators in assessing attribution of savings to the IOUs. Cadmus reviewed recent sample CCTRs and determined that they took into account prior recommendations to improve them and recommended no additional changes.

Cadmus reviewed the IOUs' C&S Program Implementation Plan (PIP). We found the document to be very informative, but in need of improvement in a few areas. The main issue was an outdated and incomplete description of the Program activities directed at compliance enhancement resulting from the fact that these components of the Program had evolved since the PIP was prepared.

An effective program theory/logic model (PT/LM) explains the program to the program team and stakeholders, assists in program planning and goal setting, and informs program evaluation. We found the overall C&S Program PT/LM to be very comprehensive and well thought out, but too focused on external roles and activities. This focus detracted from the purposes that the PT/LM needed to serve.

Another consequence of the way the PT/LM was structured was an inadequate portrayal of the role of the Extension of Advocacy (EOA) and Compliance Enhancement Program (CEP). This lack of clarity was consistent with the fact that these activities were the ones that changed the most after the PIP was prepared.

Finally, we reviewed the C&S Program savings estimates from the IOUs and found significant differences in how savings were calculated, though they were provided in similar formats. These differences created uncertainty for the CPUC, which was especially important given the large proportion Program savings represent of the overall portfolio.

Cost-Effectiveness Methods

Because this cycle is the first time the C&S Program will be included in the CPUC's risk/reward determinations, it will be the first time that cost-effectiveness will be analyzed. Consequently, Cadmus was asked to investigate how the CEC determines cost-effectiveness, review the CPUC method, and explore the implications of the two methods.

The CEC bases decisions to adopt a new code or standard on application of a consumer life cycle cost analysis. Thus, consumer utility rates, energy savings, and incremental consumer costs are taken into account. The CPUC judges programs based primarily on the Total Resource Cost (TRC) and Program Administrator Cost (PAC) tests. The two agencies use different discount rates, measure lives, and savings valuations.

We found that the two methods were likely to produce different determinations when applied to a specific code or standard or group. Consequently, the C&S Program faces some uncertainty in terms of whether a code or standard for which the utilities advocate would be determined to be cost-effective under either or both criteria.

Our major finding was that the existing CPUC cost-effectiveness tool is not adapted to assessing appropriately a new code or standard. A major gap is its inability to take into account savings from buildings and appliances produced in future years that are covered by a code or standard adopted in the present. Also, incremental costs of meeting the code or standard are likely to decline in the future, but there is no extant information to make this adjustment in the tool.

Applying the PAC test to the C&S Program advocacy activities is likely to indicate the Program is highly cost-effective even if the TRC shows it is marginally, or even not, cost-effective. This suggests there may be merit in giving more consideration to the PAC test (or applying a broader societal test) since not doing so could forego significant energy savings.

Processes and Operations

The C&S Program is universally acknowledged to have excellent coordination and communication among the team members. With the exception of PG&E, Program implementers felt their staff levels were adequate for current operations. Most implementers believed they could use more staff and resources effectively to increase energy savings. Additional resources would be useful to support Title 20 efforts, expand software capabilities, and increase participation in federal standards. The Program is constrained, however, by the limited resources the CEC has available to adopt new codes and standards.

Several C&S Program staff believe more could be done to communicate within the utility about the role and benefits of the Program. Some are concerned that it is difficult to communicate to external audiences what benefits result from the utilities advocating for and supporting codes and standards.

Staff members in the other efficiency programs have concerns about new codes and standards raising the efficiency bar, thus making it more challenging to implement other programs to produce savings. Some of these staff also feel that codes or standards occasionally have gone into effect before the market was sufficiently ready.

Staff and managers within the utilities have a general understanding that the C&S Program is a piece of the utility energy-efficiency portfolio, which includes the emerging technology and energy-efficiency programs. There is a common interest in enhancing the integration and coordination among these portfolio elements and, given the significant savings potential of the C&S Program, utility planners are making significant strides in this direction.

Views about the C&S Program Website were mixed. In general, stakeholders felt the Website was useful, but it could benefit from better organization and accessibility. Stakeholders also provided comments about the CEC's Website and the most common issue raised was the need for a more transparent file naming convention.

A key component of the C&S Program advocacy efforts is a series of CASE Studies providing technical, market, and economic data supporting advocacy of new codes or standards. The CASES Studies are generally acknowledged to be an important contribution to the adoption process. Most observers considered them to be technically solid, but several industry stakeholders faulted them for not relying upon the most complete and accurate data. Obtaining the best quality data, however, was a challenge in several cases because of industry reluctance to make key data available. Some industry participants also considered the utilities and their consultants to have an inadequate understanding of the market in which the firms participated.

The goals established to date for measuring success of the Program have not been very effective or efficient. Some industry stakeholders feel the Program focuses too much on increasing the number of new codes and standards without ensuring that existing ones are producing sufficient energy savings. The strategic and overarching goals established by recent energy and climate change legislation and policy are generally consistent with more stringent codes and standards and, though these additional requirements pose challenges, the C&S Program staff have responded directly by strategizing around areas in which they have the most control.

External Communication and Coordination

Success of the C&S Program depends heavily on its ability to communicate and coordinate with entities external to the Program, as well as within the Program. Representatives of other utility programs typically would like to know more about the C&S Program and, as noted earlier, the utilities are moving toward enhanced coordination across all portfolio programs.

The C&S Program team works extensively with the CEC staff and the relationship has both positive and challenging aspects. Communications are generally good in both directions and productive. The C&S Program team, however, has some concerns about their inability to anticipate in some circumstances what the CEC Commission will decide with regard to adopting an individual code or standard.

External code and standard advocates generally have a good understanding of the role played by the utilities. Industry stakeholders, on the other hand, often have a less accurate understanding of the utility role. Given that the utilities and their consultants are often leading the charge toward more stringent standards, many industry representatives raised concerns about the role played by the utilities. In general, interactions with Title 24 industry stakeholders have often been more positive than they have with Title 20 industry stakeholders.

In the federal standards arena, it has proven more challenging for the utilities to play a major role. This is due, in part, to limitations on U.S. Department of Energy's (DOE's) ability to work directly with outside parties. Most observers believe the utilities can be most effective by providing sound analyses and data to the DOE process.

Differences in schedules of the various rulemaking and other processes have proven to be a challenge for the C&S Program. The California Strategic Plan establishes an ambitious timeline and the utilities are subject to multiyear planning cycles from the CPUC. The C&S Program faces the added challenge of adapting to the CEC's timelines since only the CEC has the authority to adopt codes and standards. Any changes in the CEC timelines can have dramatic

effects on the outcome of the C&S Program. Similarly, at the federal level the utilities must constantly monitor and adjust to any changes in DOE's schedule.

The inherent gap between when the utilities advocate for a new code or standard and when the energy savings are generated is also a potential problem. The CPUC has accommodated the existence of this gap by treating Program efforts and expenditures in the years in which they occur along with the Program savings generated by those standards in effect to date.

Decision-Making Processes

The IOUs indicated that they have focused on advocating for codes and standards that would produce the largest energy savings, driven in part by the state Strategic Plan and Zero Net Energy goals. During the latest cycle, the C&S Program worked with the CEC to develop a statewide approach for prioritizing which codes and standards to pursue.

The C&S Program input has been influential in the final CEC decision-making regarding adoption. In some cases, the utilities' position established a counterpoint to industry opposition, allowing the CEC to seek adoption of a tighter code or standard than would have otherwise been possible.

The IOUs and their consultants interacted in several ways with external stakeholders in the codes and standards decision-making process. Many industry stakeholders commented, though, that they were not able to make effective contributions to the process due to the timing and resources required. For Title 24, the IOUs supported stakeholder meetings to investigate possible code upgrades and they provided a less formal venue than CEC workshops through which stakeholders could provide input to the process. No similar meetings were held for Title 20, however, since the CEC Title 20 staff did not approve of this approach for standards.

Views differed on whether the pace of code and standard adoption was appropriate. Industry generally felt it was too rapid and insufficient effort was dedicated to ensuring compliance, while the CEC staff felt the pace was about right. Utilities, on the other hand, felt the Strategic Plan and other state policies and legislation demanded a steeper slope in the code and standard adoption curve.

Extension of Advocacy

All the utilities included training in their EOA activities. PG&E, however, also categorized as EOA the support given to the Compliance Improvement Advisory Group (CIAG), California Association of Building Energy Consultants (CABEC), and on the Certified Energy Analysis (CEA) Exam. To date, the number of trainings delivered has surpassed the EOA's target. The Program has implemented pre- and post-training exams to assess the effect of the training.

The EOA training has faced planning and timeframe challenges. EOA staff believe that the CEC code cycles are not sufficiently long to allow the training to be fully developed and implemented most effectively, a view shared by some in the industry.

We assessed the training participant survey data compiled by the EOA implementers. We compared the number of correct subject matter test answers before and after the training to determine whether they improved. Out of 23 combinations of training type and question

category, all scores except one showed a positive change, indicating students gained knowledge from the training. The average improvement was 13%. Even after training, however, the average amount of correct answers was typically only between one-third and one-half.

Note, however, that it was difficult to draw reliable conclusions from these results, as questions asked in the pre- and post-training tests differed. Furthermore, no measure has been taken to date of the effect of the training on field practices.

EOA has been applied only to Title 24 so far, but there is interest in implementing similar efforts with Title 20. Title 20 EOA planned activities differ from those conducted for Title 24, focusing more on outreach to manufacturers and distributors, ensuring they know of Title 20 standards and how to register products. A successful program will require close cooperation between the IOUs and CEC.

Recommendations

Our major recommendations are summarized below by topic.

Program Documentation

To make the PIP more useful and more effective in explaining the Program:

- *Clarify differences and the uniqueness of subprograms.*
- *Implement a process to fully document interim program changes.*

To improve program theories and logic models:

- *Develop separate theories and logic models for the subprograms*.
- *Include more detailed information on the activities, actions, outcomes, and links within the Program.* Explain and show adoption and energy savings as outcomes of the Codes and Standards Advocacy Program.
- *Provide a narrative of the program theory that communicates why and how activities are expected to lead to outcomes*.
- *Simplify external inputs in the visual logic model into a shared high-level box.*

To improve how savings are reported:

- *IOUs should continue efforts to establish statewide consistency in reporting Program savings.*

CEC and CPUC Cost-Effectiveness Methods

This cycle will be the first to include the C&S Program in the CPUC's risk-reward financial mechanism, which will require a determination of the Program's cost-effectiveness. Unlike other IOU programs, savings attributable to the C&S Program depend on actions of another agency, the CEC, and its assessment of cost-effectiveness. Thus, it is important to understand the CEC's cost-effectiveness test and its implications, and to progress toward applying a CPUC test that

treats the C&S Program in a way most effective, equitable, and compatible with CPUC policies and objectives.

- *The IOUs and C&S Program should engage in joint studies with the CPUC and CEC to develop an appropriate cost-effectiveness methodology for the C&S Program.* As this report was being prepared, the CPUC has taken some initial steps to address this issue.

Program Processes and Operations

To continue improving program processes and operations, the Program should:

- *Maintain existing communication processes involving the statewide Program team and the CPUC and CEC.*
- *Continue communicating the Program's resource needs to the IOUs' upper management and the CPUC.*
- *Reexamine the allocation of resources between Title 24 and appliance standards activities (Title 20 and federal standards), accounting for Zero Net Energy goals, the CEC's larger resource allocations to Title 24, cost and impacts of federal standards advocacy, and other factors.*

To increase the Program's ability to work effectively with other IOU programs and staff, we provide these recommendations:

- *Continue portfolio level planning to assess the best strategy (Emerging Technology, Energy-Efficiency Program, or C&S Program) for increasing efficiency of specific measures and products at the portfolio level to both optimize savings and minimize possible conflict between the C&S Program and other programs.*
- *Continue to communicate opportunities and areas of program overlap, interim findings, and progress on individual codes and standards with EE and ET program staff through regular meetings and written communications.*
- *C&S Program staff should expand their efforts to help IOU upper management and efficiency program staff to better understand the C&S Program.*

The HMG and CEC Websites provide critical resources to C&S Program stakeholders, and could be made more useable and effective. To do so, we recommend the following:

- *Apply a consistent file naming convention that makes it possible for site users to identify documents more easily.*
- *Post all materials and organize them in a way that makes the Websites easier to navigate.*
- *Improve the internal Program Website, so progress on each code and standard can be easily seen in real time.*

To make the Program's goals and metrics more realistic and meaningful, the Program should:

- *Revise program performance metrics (PPMs) to provide better measures of Program success.* Link PPMs to specific elements in the program theory and logic models once these documents have been revised appropriately.

C&S Decision-Making Processes

To make the codes and standards selection and adoption process more effective and minimize risks associated with the CEC's processes, we recommend the following:

- *C&S Program staff should continue to be involved with CEC staff in the next cycle of the rulemaking process as early as possible.*
- *Program staff should reach out to CEC Commissioners to understand their interests and concerns, and to vet possible codes and standards.*
- *The Program should support more involvement in DOE rulemaking processes and meetings, and look for ways to become involved earlier in the process*. The Program should continue to leverage its federal efforts with organizations such as ASAP and other states, and with utilities outside California.

To increase effectiveness of working with industry, the C&S Program should:

- *Continue conducting targeted Title 24 stakeholder meetings*.
- *Explore with the CEC ways the Program can become involved with Title 20 stakeholders in ways accomplishing objectives similar to those of Title 24 stakeholder meetings.*

To address schedule and timeline challenges, the Program should:

- *Work with CPUC to ensure the cost-effectiveness and risk-reward mechanism equitably accounts for the lag between Program efforts and energy savings.*
- *Explore with the CPUC ways to make it possible to initiate evaluation activities as early as possible after codes or standards are adopted*.

Extension of Advocacy Activities

To enhance the EOA's effectiveness, we recommend the following:

- *IOUs should develop an integrated approach to enhance code compliance.* The EOA training activities and the efforts associated with the CEP should be reexamined and combined into an integrated subprogram or component of the C&S Advocacy subprogram with clearly defined activities, roles, and objectives.
- *Program staff should work with the CPUC and CEC to align goals, funding, and timing to improve the EOA's effectiveness*.
- *EOA staff should continue narrowing the training material covered to what is most important, so students learn the most critical information*.

To institute an effective Title 20 EOA, we make the following recommendations:

- *The Title 20 EOA should adopt the Title 24 EOA best practices delineated in Chapter 10*.

- *The C&S Program should continue fostering a solid working relationship with CEC Title 20 staff as the basis for developing a Title 20 EOA.*

To enhance the ability to measure effects of the Extension of Advocacy, we recommend that the EOA staff:

- *Investigate ways to measure actual behavior changes attributable to EOA trainings.*
- *Collect information on training participants' characteristics, and link these to their pre- and post-training test scores.*
- *Use the same questions on the pre- and post-training tests.*
- *Conduct a six-month follow-up to determine how trainees are using what they learned, and how behavior has changed.*

2. Introduction

Evaluation Activities and Objectives

Southern California Edison (SCE) and Pacific Gas & Electric (PG&E) contracted with The Cadmus Group, Inc., to perform a process evaluation of the California Investor Owned Utilities' (IOUs) Codes and Standards Program (C&S Program or the Program) for the 2010–2012 program cycle. Chapter 3 describes the Program, which consists of several subprograms. This evaluation covers the following subprograms:

- Building Codes: Title 24 Advocacy, CASE Studies, Extension of Advocacy
- Appliance Standards: Title 20 Advocacy, CASE Studies, Extension of Advocacy
- Appliance Standards: Federal Standards Advocacy

This evaluation seeks to provide feedback to Program managers on how C&S Program processes affect outcomes, and to identify adjustments that can increase the Program's and subprograms' efficiency and effectiveness. This evaluation is especially timely given that the California Public Utilities Commission (CPUC) will allow the IOUs to include the Program in the eventual risk/reward mechanism for this program cycle, as well as count Program energy savings toward savings goals. The fact that claimed savings are likely to be on the order of 15% to 30% (net and gross, respectively) of the total portfolio makes it critical that process evaluation feedback be provided now and reflected in adjustments to the Program.

Program and subprogram evaluation objectives include the following:

- Document operations;
- Compare the Program and subprogram designs to their implementation;
- Perform qualitative evaluations of Program and subprogram activities;
- Identify implementation challenges; and
- Assess opportunities to increase C&S Program efficiency and effectiveness.

Report Organization

Following the Executive Summary and this introductory chapter, the report's remaining chapters include the following:

- Chapter 3—Program Overview
- Chapter 4—Evaluation Approach and Methods
- Chapter 5—Findings from Cost-Effectiveness Methods Review
- Chapter 6—Findings from Cost-Effectiveness Methods Review
- Chapter 7—Findings on Program Processes and Operations
- Chapter 8—Findings on External Communication and Coordination

- Chapter 9—Findings on C&S Decision-Making Processes
- Chapter 10—Findings on Extension of Advocacy
- Chapter 11—Conclusions and Recommendations

3. Program Overview

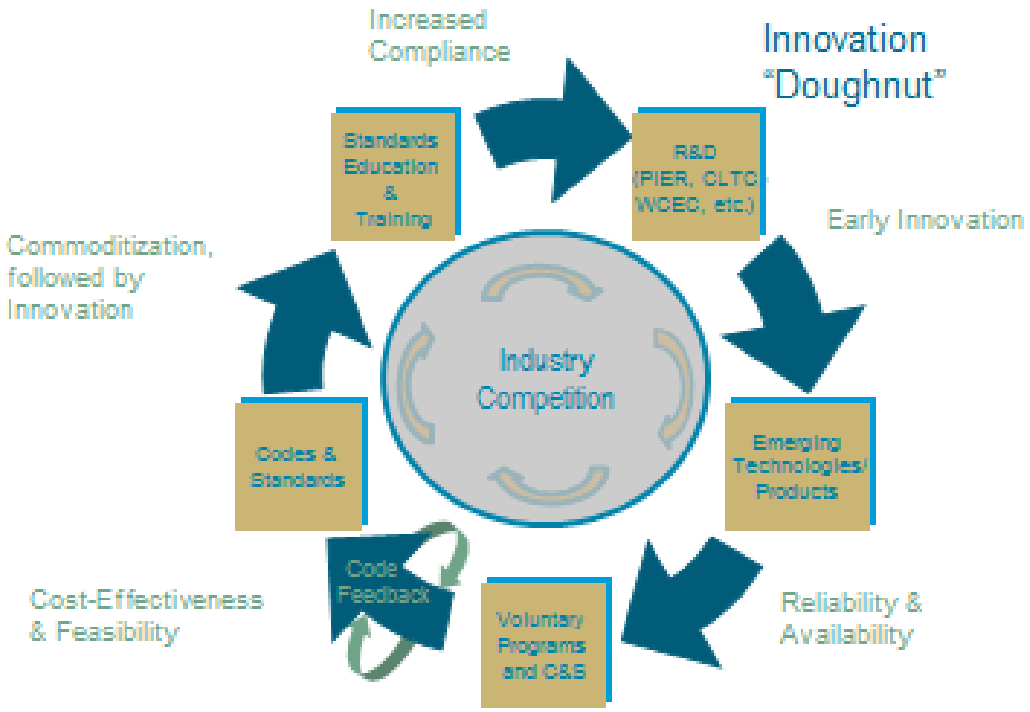
The California Energy Commission (CEC) has the responsibility and authority to adopt both building energy-efficiency codes and appliance efficiency standards.

In recent years, California's IOUs have become active players in the codes and standards adoption process, advocating for measures to target and providing technical and market background to inform the process. In the 2006–2008 program cycle, the CPUC allowed the IOUs, for the first time, to claim energy savings for their efforts to advance codes and standards. During the 2010–2012 cycle, the CPUC will allow the IOUs to not only claim energy savings, but include the Program in the eventual risk/reward mechanism implemented by the CPUC. During the current cycle the IOUs' activities have extended beyond advocating for codes and standards adoption to supporting other subprogram activities intended to enhance energy savings from codes and standards.

The IOUs view the C&S Program as a key step in a cycle of diffusion of energy-efficient technologies and practices, involving multiple players and program types, as shown in Figure 1, below. The IOUs engage in Emerging Technologies and voluntary Energy-Efficiency programs. However, as these programs often capture only a portion of the potential energy savings in the market, the IOUs view market intervention through codes and standards as essential to maximizing energy-efficiency opportunities. When an energy-efficiency code or standard is implemented, high-efficiency products, which usually cost more than standard-efficiency products, become the new baseline products. This typically results in two positive effects: (1) eliminating less-efficient products from the market; and (2) reducing costs through increasing the production volume of formerly more expensive high-efficiency products. The net effect leads to a substantial decrease in energy efficiency's cost to society. Manufacturers then look for new ways to differentiate their products, including creation of higher-efficiency products; so they can earn higher profit margins, continuing the cycle of innovation and increased energy efficiency.

Through the statewide C&S Program, each IOU implements similar, coordinated subprogram activities to support adoption, enhancement, and implementation of building energy-efficiency codes (California Title 24) and appliance efficiency standards (federal and California Title 20). These programs are highly coordinated among the IOUs, and increased energy savings that can result from them can prove to be crucial to the state in achieving its energy-efficiency and greenhouse gas (GHG) reduction goals.

Figure 1. C&S Program Role



Source: California IOU presentation, "Coordinating Our Lighting Efforts," September 15, 2011.

In reviewing various Program documents, we found varied terminology used in different places; in particular, certain activities were called "subprograms" in some place and "components" in others. For this document, we refer to the bundle of all activities as "the Program" and identify the following as "the subprograms":

1. Title 24 Advocacy, CASE Studies, and Extension of Advocacy (EOA)
2. Title 20 Advocacy, CASE Studies and EOA
3. Federal Standards Advocacy
4. Compliance Enhancement
5. Reach Codes (RC)

This evaluation addresses the first three subprograms; the last two will be covered in an evaluation conducted by Cadmus and DNV KEMA, under a contract with the CPUC.

The Advocacy programs identify energy-efficiency technologies and strategies, evaluate their market readiness, and, if appropriate, support their adoption into codes and standards. Codes and Standards Enhancement (CASE) Studies are components of the Advocacy subprograms, and are reports based on in-depth research on energy-efficiency measures or strategies to provide documentation supporting the IOUs' advocacy of specific codes and standards. These studies seek to provide the CEC with background information, and an understanding of the technical

feasibility, cost-effectiveness, market status, and other pertinent information for the proposed code or standard.

Extension of Advocacy activities work with the industry to ensure codes and standards that IOUs advocate are implemented for maximum impact. These activities are targeted for enhanced compliance and enforcement.

Through the Federal Standards Advocacy subprogram, the C&S Program seeks to influence the U.S. Department of Energy (DOE) in setting national energy policy for appliance standards.

More details on these subprograms follow below.

Building Codes

Title 24 Advocacy

Title 24 Advocacy primarily seeks to promote regulatory changes to strengthen and expand building standards found in Title 24, Part 6, of California's Building Standards Code. Title 24, Part 6, was last updated in 2008. The IOUs' Title 24 Advocacy subprogram develops CASE Studies to support adoption of new building codes and additions to existing ones that increase energy-efficiency requirements. The CASE Studies are then provided to the CEC as the basis for proposals for the next cycle of building codes, and are provided to the public for the stakeholder review and comment process. The IOUs continue their support of the proposed codes throughout the public stakeholder process.

Appliance Standards

Title 20 Advocacy

The Title 20 Advocacy subprogram provides support for California's appliance standards. To help drive this process, the Title 20 Advocacy subprogram develops CASE Studies. These studies provide support for adopting new regulations and broadening the scope of existing Title 20 appliance standards. The CEC then revises and posts the CASE Studies to become part of the public stakeholder process. The IOUs continue their support throughout the public stakeholder process.

Federal Advocacy

The Federal Appliance Standards Advocacy subprogram seeks to influence outcomes of federal standards proceedings affecting California, primarily the federal appliance efficiency regulations adopted by DOE. As federal regulations are applicable throughout the United States, increases in federal efficiency regulations result in energy savings in California. Since they are national in scope, noncompliance is less likely to be an issue.

Federal advocacy strives to increase the stringency of federal standards or their likelihood of adoption. These efforts also work to advocate for adoption of standards at the federal level that are in place in California, or to push for early adoption of standards in California that are intended to become future federal regulations.

To support federal adoption of desired regulations, the Program conducts research, develops analytical commentary, and advocates, as appropriate, on behalf of California in all proceedings with significant energy impacts. Program representatives attend and offer comments at DOE proceedings and legislative negotiations. In addition, the Program participates in the federal appliance standard updating proceedings, and in the negotiation processes with industry.

Extension of Advocacy

The current Extension of Advocacy activities (EOA) support implementation and enforcement of the Title 24 codes, once they have been adopted. Achieving code compliance can be challenging, due to a lack of knowledge and expertise in the industry regarding code compliance, and a lack of resources available to entities enforcing the codes. To date, the EOA primarily has focused on training various stakeholders in the building code arena.

At the time this evaluation was conducted, no EOA efforts were being implemented to support appliance standards. However, the evaluation sought to provide insights into the ways EOA could be conducted, in conjunction with appliance standards.

4. Evaluation Approach and Methods

Researchable Issues

This study's broad objectives sought to:

- Document program operations;
- Compare program implementation with program design;
- Perform qualitative evaluations of program activities;
- Identify program implementation challenges; and
- Assess the subprograms for opportunities to increase efficiency and effectiveness.

The IOUs defined a set of researchable questions and issues to guide the evaluation, as described below:

1. Review logic model, program theories, and program implementation plans (PIPs), and compare these to program operations.
2. Evaluate Building Codes (Title 24), Appliance Standards (Title 20) Advocacy, and EOA subprogram processes and activities. The following researchable questions apply to each subprogram, unless otherwise specified.
    a. To what extent did the subprogram's activities align with the given C&S program theory and logic models? Are there subprogram aspects that must be documented in the program theory and the logic models?
    b. To what extent did the subprograms meet their success criteria? What challenges does the C&S program face in strategic planning with respect to satisfying savings goals required by AB1109? Provide recommendations on analyses, tools, and process improvements that can assist in C&S strategic program planning.
    c. Assess the process for identifying prospective code enhancements: review the sources of the current code change advocacy efforts—energy-efficiency (EE) measures, emerging technology (ET) studies, or other market sources—and make recommendations for process enhancements
    d. Assess the program planning and evaluation challenges the C&S program may face in managing the disparate organization regulatory schedules (CEC Title 20/Title 24, DOE, and CPUC EE), and provide recommendations for process enhancements. Describe the Codes and Standards program's advocacy planning and CASE development timeframe that supports these CEC cycles; describe the CEC's current, recent past, and future Title 20 and Title 24 code change cycle schedules (at a high level); and document CPUC EE program and evaluation cycles. An example of a challenge is C&S Impact Evaluations measure impacts of past code changes resulting from advocacy efforts from previous years and program cycles. If the program is planning for advocacy efforts, sometimes several years in advance of CEC code change proceedings, how effective is the program in capturing all appropriate evidence of IOU or consultant advocacy in CASE Studies or Code Change Theory

reports for attribution determination?[1] Provide recommendations on how to enhance long-term data collection efforts that capture advocacy work of the different organizations supporting the Statewide Codes and Standards program.

e. Assess communication and coordination processes between the C&S program and EE programs. One strategy, as explained in the PIP, is, for code changes coming into effect in the near future, the C&S program communicates these code changes to the EE programs; so the EE programs can help "prime the market" for changes by offering incentives for meeting the new codes early. How is this collaboration occurring in practice, and how might the C&S and EE program managers develop a process, whereby information about code change proposals currently in progress are accessible?

f. Identify issues in working for code changes with the CEC that lead to uncertainty in meeting C&S program goals. Provide detailed recommendations for how the C&S program can incorporate "CEC process risk" into program planning.

3. Evaluate Building Codes (Title 24) and Appliance Standards (Title 20) EOA processes and activities. The following researchable questions apply to each subprogram, unless otherwise specified.

   a. Evaluate the process for establishing and prioritizing EOA activities. For measure-based training, are the measures focused on those with the greatest savings impact, are they measures with the lowest compliance rates from the previous code change cycles, or both? Provide recommendations on how the program can optimally choose measures to focus on for measure-based training.

   b. Perform qualitative evaluations of other EOA activities (i.e., role-based trainings, stakeholder outreach, and other code enhancement support), through analysis of data collected by EOA program, or through primary data collection (e.g., interviews and surveys of training participants).

   c. Provide recommendations on how best practices from Title 24 EOA can be implemented in Title 20 EOA efforts.

4. Evaluate the Federal Appliance Standard Advocacy subprogram.

   a. To what extent did the Federal Appliance Advocacy (DOE Rulemaking and Test Procedure) activities align with given C&S program theory and logic models? Are there aspects of the subprograms that must be documented in the program theory and the logic models?

   b. Assess the process for identifying federal appliance standard enhancements: review the sources of the current code change advocacy efforts—Title 20, EE measures, ET studies, or other market sources—and make recommendations for process enhancements

   c. Assess the DOE's current and future rulemaking process and current schedule for federal appliance standards enhancements; describe the Codes and Standards

[1] CASE Study and Code Change Theory documents are described later.

program's advocacy planning and timeframe supporting these cycles; and describe CPUC EE program and evaluation cycles. Identify some challenges the Program may face in managing these various schedules; and provide recommendations for process enhancements.

d. Assess challenges the Federal Appliance subprogram faces in accomplishing its programmatic goals, and provide recommendations for addressing those challenges

Evaluation Approach

The study sought to provide findings and recommendations applicable to the various Program efforts and subprograms implemented statewide.[2] Evaluation activities consisted of the following:

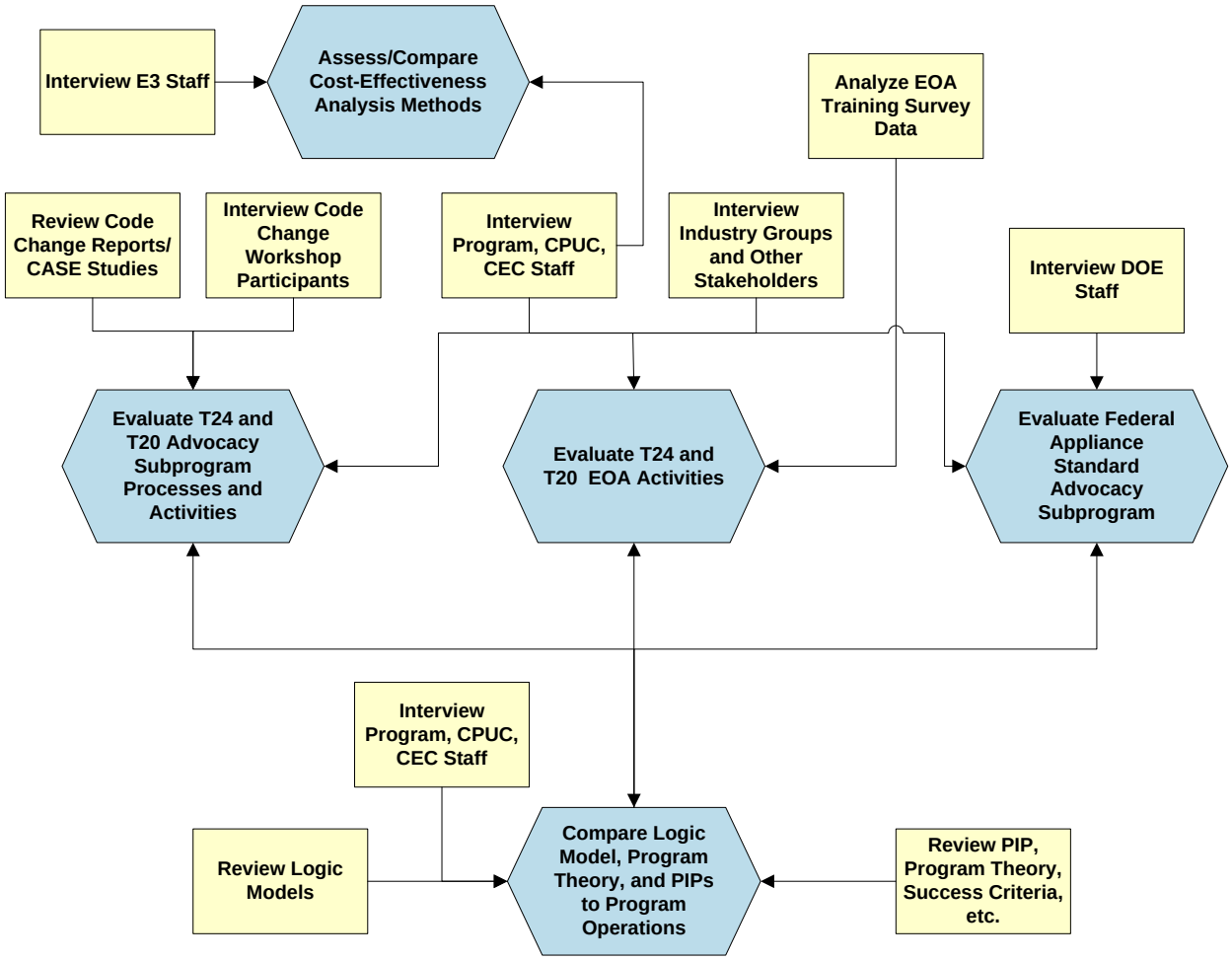
1. Reviewing Program documentation.
2. Reviewing and assessing the Program Theory and Logic Model.
3. Assessing Code Change Theory Reports.
4. Comparing the CPUC and CEC cost-effectiveness methodologies.
5. Interviewing:
   a. C&S Program staff.
   b. Consultants to the IOUs for the C&S Program.
   c. Extension of Advocacy staff.
   d. The CEC Codes and Standards staff.
   e. CPUC staff.
   f. Participants in the federal standard adoption process.
   g. Emerging Technology program staff.
   h. Energy-Efficiency program staff.
   i. IOU portfolio management staff.
6. Analyzing Extension of Advocacy role-based training participant survey data.

All tasks were conducted to inform researchable issues addressed at the beginning of this chapter. As a result of discussions with the IOUs and other stakeholders, and through discussions that occurred during the project kickoff meeting, the CPUC asked Cadmus to add to the original list of researchable issues a research topic (item 4, above) to investigate the CEC and CPUC methodologies to assess cost-effectiveness. This was driven by IOU and CPUC concerns that differences between CEC and CPUC methods could lead to discrepancies between codes and standards the IOUs would pursue and ones the CEC would likely adopt.

[2] Due to funding decisions, the majority of this study's efforts focused on evaluating C&S efforts by SCE and PG&E.

As many evaluation activities provided insight into multiple research questions, Chapters 5 through 10 have been structured topically, as opposed to being grouped by research activity. Figure 2 illustrates activities conducted in this study. Data collection and supporting research tasks are shown in the rectangular boxes, and core analyses are shown in the hexagonal boxes.

Figure 2. Evaluation Activities



Documentation Review and Assessment

The Cadmus evaluation team reviewed documents to inform and support the evaluation activities. The IOUs initially provided the PIP, program theories, and logic models. Cadmus then conducted Internet research to locate additional program documents relevant to the evaluation (e.g., stakeholder meeting materials, CEC workshop materials). IOUs and interview respondents added more program documents throughout the evaluation. We used an Excel workbook to catalog all documents received and discovered through Internet research.

Review of Program Theory and Logic Model

The evaluation team reviewed two of four existing program theory and logic models[3] for the C&S Program, including those for the C&S Program Advocacy and C&S Program Federal Appliance Standards Advocacy subprograms. The two other subprograms with program theories and logic models are being reviewed in the impact evaluation.

We compared program theories and logic models to current Program operations, as defined by Program staff interviewed. Interviews with key Program staff included questions asking respondents to walk through Program processes and logic. We also asked Program managers about development and structure of program theories and logic models.

In addition to comparing the theory/logic model against program operations, we assessed the logic model/program theory, based on Cadmus' knowledge of best practices, and the following guidance from the Program PIP and the California Evaluation Framework. The C&S Program PIP states the primary purpose of program theories and logic models is to "provide evaluators an understanding of program activities, outputs, and outcomes."[4] The California Evaluation Framework describes program theory as "a presentation of the goals of a program, incorporated with a detailed presentation of the activities that the program will use to accomplish those goals and the identification of the causal relationships between the activities and the program's effects." [5]

Assessment of Code Change Theory Reports

At the conclusion of the CPUC Codes and Standards Program Impact Evaluation (2006–2008), the California IOUs asked the independent evaluator, Cadmus, for recommendations to improve documentation of future utility efforts to support code and standards development. The IOUs documented their efforts in Code Change Theories, which summarized their efforts and included the following:

- A description of the rulemaking process;
- An overview of the C&S Program;
- A brief summary of Program activities in support of the code or standard;
- A program logic model; and
- Brief descriptions of communications with key stakeholders.

At that time, Cadmus provided a list of recommendations for improving the Code Change Theories, including the following:

1. The IOUs should provide more information about the purpose of the code change, the market, and market barriers; this would provide greater context for understanding IOU and other stakeholder contributions.

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[3] We refer to the graphical representation of the program as the model, and the descriptive text as the program theory.

[4] Southern California Edison *2010 – 2012 Energy-Efficiency Plans*, January 2011, p. 744.

[5] T*he California Evaluation Framework*, TecMarket Works, June 2004, p. 31.

2. The Code Change Theories should specifically address IOU contributions in the three areas where they are evaluated: (1) development of compliance test and other analytic methods; (2) development of code language and analysis of energy savings and cost effectiveness; and (3) demonstrating the feasibility of the standard, including efforts at stakeholder outreach.
3. The Code Change Theories should better document efforts to work with the CEC, industry, and other stakeholders.

For the 2010–2013 evaluation cycle, the IOUs revised their approach for documenting their contributions to code development, and provided Cadmus with advance copies of Title 20 Portable Fixtures and Title 20 Televisions Code Change Theories for review. Cadmus reviewed the reports, based on the previous recommendations, described above, and with a mindset seeking to provide additional feedback for structuring the Code Change Theory Reports for the current cycle.

Comparison of CPUC and CEC Cost-Effectiveness Methodologies

The CEC and the CPUC play different roles in California's regulatory framework, and each has defined methods for analyzing cost-effectiveness that support these roles. Cost-effectiveness results prove important because they influence financial rewards earned by the IOUs. The process evaluation reviewed the two methods to shed light on how they are defined and applied, increase understanding of their differences, and help the IOUs make better decisions about advocating for selected codes and standards. We are aware of two other efforts, to date, examining the differences: a spreadsheet developed by Jon McHugh of McHugh Energy Consultants, Inc., providing a graphic and summary table comparing the two methods; and a report prepared for the CPUC and CEC by Energy and Environmental Economics, Inc. (E3). For this process evaluation, we reviewed the spreadsheet and conducted several discussions with Mr. McHugh.[6]

Stakeholder Interviews

From late November 2011 through March 2012, Cadmus conducted interviews with a broad array of C&S Program stakeholders. Interview questions were qualitative and varied for each respondent group. We developed interview instruments protocols, based on the project evaluation plan and feedback from the kickoff meeting. We provided draft instruments to the IOUs for their review, and revised them as needed. In some cases, unique questions were developed to match a particular respondent's expertise.

Table 1, below, summarizes the number of interviews completed for each type of respondent. Originally, we proposed to conduct 60 interviews, and completed 72.

The IOUs initially suggested a list of stakeholders to interview. Cadmus then identified other interviewees, including codes and standards advocates, industry stakeholders, and those involved with the federal process. The IOUs suggested several contacts at the DOE, which we could not interview, due to DOE's reluctance to comment on stakeholder involvement. To gain insights on

6 We did not receive a copy of the E3 paper for review, but we exchanged e-mails and had telephone discussions with Amber Mahone at E3 to clarify our understanding of the methods used.

the federal process, we used existing Cadmus relationships, networking, and a snowball approach to identify other knowledgeable interviewees.

Table 1. Stakeholder Interviews Conducted

Respondent Type	Number of Interviews
C&S IOU Program Staff	11
IOU Consultants	12
IOU Portfolio Manager	2
IOU ETP/EE Program staff	5
CPUC Staff	1
CEC Staff	9
Federal Process Respondents	4
C&S Advocates	10
Affected Industry Stakeholders	17
E3 Expert	1
Total	72

To achieve a balanced sample of codes and standards advocates and industry stakeholders, Cadmus compiled a list of attendees at the IOU-sponsored Title 24 stakeholder meetings, CEC Title 20 and 24 workshops, and hearings for various codes and standards. Other information, such as the relevant code or standard, number of events attended, contact information, and affiliation, also was documented. To ensure interviewees had not simply attended a meeting, but were engaged in the process, we screened the lists to eliminate individuals who had participated in less than two events. We then selected a sample, based on codes and standards adopted in the 2010 to 2012 program cycle.

We originally attempted to interview an equal number of codes and standards advocates and industry representatives for both Title 20 and Title 24; however, due to the limited number of Title 20 advocates and the varying industries affected by Title 20 standards, we found this was not possible. Throughout the interview process, we periodically revisited our target list, adding and removing potential interviewees to satisfy our targets and to ensure a balanced sample.

Table 2 and Table 3 provide more details about the sample. Table 2 summarizes advocate and stakeholder respondents, and Table 3 shows the number of respondents, by measure type.

Table 2. Number of Advocates and Industry Stakeholders Interviewed

	Area of Involvement	Number of Interviewees
Advocates and Industry Stakeholders	Title 20 Advocates	3
	Title 20 Industry Stakeholders*	13
	Title 24 Advocates	7
	Title 24 Industry Stakeholders*	7

*Several stakeholders indicated involvement in both Title 20 and Title 24 processes. These respondents are counted twice in this table.

Table 3. Number of Respondents by Measure Type

	Stakeholder Representation	Number of Interviews
	Total Title 20 Interviewees	13
Title 20 Areas of Involvement	Consumer Electronics	3
	Battery Chargers	7
	Set Top Boxes	2
	Television	2
	T20 Lighting	2
	Total Title 24 Interviewees	14
Title 24 Areas of Involvement	Solar	2
	T24 Residential	5
	T24 Non-Residential	1
	HVAC & Duct Work	2
	Roofing Materials	1
	T24 Lighting	3
	Water Heating Systems	2
	Fenestration	1

Representation shown is based on interviewee responses. Many of the respondents indicated involvement in multiple topic areas.

Analysis of EOA Training Participant Survey Data

Cadmus reviewed and analyzed data supplied by PG&E for six types of role-based training courses held between August 2010 and December 2011.[7] Cadmus did not evaluate the courses themselves, but reviewed and analyzed the data from the pre- and post-training surveys developed by the implementers. Our analysis assessed changes in knowledge and feedback on trainings and suggested areas for improvement.

Data consisted of pre- and post-training tests given during the workshops, and course evaluations taken upon completion. The 68 one-day workshops, held in 30 different cities around the state, were attended by 1,655 participants. Individuals with varied experience attended the Standards Essentials for Energy Consultants (EC) courses, while attendees at the Standards for Plans Examiners and Building Inspectors (PEBI) and the Title 24 Modeling Essentials (Modeling) had more specific interests and backgrounds in the subject areas. Table 4 shows the six courses, the number of classes conducted, and the number of participants for each type of class.

[7] Other activities related to compliance enhancement are being examined as part of the C&S Program impact evaluation.

Table 4. Training Participants and Classes by Course Type

Course	Number of Classes	Number of Participants
Residential Standards Essentials for Energy Consultants (Res EC)	8	264
Residential Standards Essentials for Plans Examiners and Building Inspectors (Res PEBI)	27	591
Residential Title 24 Modeling Essentials (Res Modeling)	3	68
Nonresidential Standards Essentials for Energy Consultants (NR EC)	12	286
Nonresidential Standards Essentials for Plans Examiners and Building Inspectors (NR PEBI)	14	367
Nonresidential Title 24 Modeling Essentials (NR Modeling)	4	79
Total	68	1,655

5. Findings from the Documentation Review

This chapter presents our findings from the document review, organized by the type of documentation examined.

Code Change Theory Reports

As part of the 2006–2008 C&S Program impact evaluation, Cadmus provided feedback on the Code Change Theory Reports the IOUs developed for that cycle. For this process evaluation, Cadmus reviewed recent Title 20 Portable Fixtures and Title 20 Televisions Code Change Theories to determine if feedback influenced subsequent reports. Overall, Cadmus found the reports significantly improved and had no further recommendations to revise the reports. In particular:

1. The Code Change Theories include an executive summary, which provides a concise but informative summary of the code development process and IOU contributions. The executive summary will be very helpful in focusing the evaluator's attention on particular issues.
2. The introduction of the Code Change Theories provides important historical context about the market and barriers to code adoption. This will allow the evaluation team to better understand adoption obstacles and contributions of the IOUs and other stakeholders.
3. A summary of significant changes to the code or standard is included. This will help evaluators better understand technical issues involved in the rulemaking.
4. The documents provide a detailed timeline of key rulemaking and advocacy activities, which will be very helpful for understanding the timing of significant developments.
5. The revised Code Change Theories include a narrative description of IOU advocacy activities, addressing their contributions in each of the different evaluation attribution areas. This is a key enhancement, and will save the evaluator time in building a narrative about stakeholder contributions.
6. There is considerably more detailed documentation of communication between the C&S Program team and other stakeholders, including the CEC.

Finally, Cadmus recognizes code theories represent the IOUs' point of view about their contributions to code development. The impact evaluators will be responsible for developing an independent judgment about IOU contributions, based on not just the Code Change Theories, but on other evidence, including transcripts of CEC hearings, stakeholder letters to the CEC, and interviews with stakeholders.

Program Implementation Plan

The evaluation team reviewed Southern California Edison's PIP for the C&S Program. This document provides a comprehensive explanation of general Program information for the 2010 to 2012 program implementation cycle. The C&S Program is complex and unique compared to other programs since its success relies on activities, market actors, and actions external to the

Program. The PIP describes Program goals, objectives, and performance metrics, along with a list of CASE Studies, description and status of all codes and standards, a description of how the C&S Program coordinates with other programs, and other information useful for understanding Program operations.

The document is very informative and functional, but in a few areas, summarized below, the structure of the PIP or contents contain gaps or could benefit from greater clarity or enhanced organization:

- Some confusion exists in the alignment of goals with subprograms. For example, Goal 1 is identified as linked to Building Codes and Appliance Standards Advocacy, but the metric for meeting the goal references the Reach Codes subprogram.
- The PIP classifies measure-based training activities as part of the Compliance Enhancement subprogram; however, we discovered through Program staff interviews that all trainings are classified under Extension of Advocacy.
- Some information is missing, and some sections are unfinished. For example, the PIP includes "to-be-determined" dates and blank tables, and information on program theory and performance indicators is missing, though these are referenced in the document.
- The C&S Program PIP is a relatively long document (84 pages), and part of a larger document, the 2010–2012 Energy-Efficiency Plan. The PIP would benefit from including a guide or table of contents to assist readers looking for specific contents.

In addition, the evaluation team found the PIP does not accurately describe the EOA or the activities it includes. This can be attributed to several factors. When the PIP was written, Program staff believed different attribution methods would need to be applied to the EOA and the Compliance Enhancement Program (CEP) activities.[8] In 2010, the IOUs decided to not pursue claiming energy savings credit for these subprograms. This lessened the need to keep activities separate between the two subprograms. Finally, the EOA Program changed due to challenges encountered and lessons learned. Differences between the PIP and current activities include the following:

- All trainings identified in the PIP under the CEP are now implemented under the EOA, which includes all role-based and measure-based trainings, whether or not the code being addressed has been adopted due to the Program.
- To date, EOA activities have only been conducted for Title 24, though the EOA activities could encompass Title 20 as well. The program staff indicated this primarily results from the needed resources not being allocated to develop the Title 20 activities.
- The research tasks outlined in the PIP for informing the development of CEP activities also were used to develop the EOA activities.
- The PIP indicates role-based trainings would be marketed through the Local Government Partnership program, but they have also been marketed through local International Code Council (ICC) chapters.

[8] The CEP has evolved to primarily become a study of building code jurisdiction best enforcement practices.

- Since the training activities have shifted from CEP to EOA the success criterion defined in the PIP for the CEP (60 role-based Title 24 trainings) is being applied to EOA.
- The measure-based training programs were the initial focus of the EOA and are now established for refrigerated warehouse standards, and soon will include lighting measures as well. The EOA staff is focusing primarily on role-based trainings now.

Program Theories and Logic Models

In addition to program documentation, having a clear and accurate program theory and logic model allows the underlying logic of a program to be communicated to the program team and external parties, such as staff working on other programs, the CPUC, and IOU management. The program theory also helps with planning and goal setting since the indicators help to identify potential ways to measure success. The program theory and logic model are also important in program evaluation since they help evaluators test the program theory and compare the various elements to actual program operations.

The evaluation team reviewed the program theory and logic model for the C&S Program Advocacy and C&S Program Federal Appliance Standards Advocacy subprograms. These documents focus disproportionately on activities, outputs, and outcomes external to the C&S Program, thus limiting how effectively they communicate about Program's operations and impacts. In the Advocacy Logic Model, only two of nine activities and one of six outputs reflect actual C&S Program elements. While it is important to understand the context in which the Program operates, external elements dominate the theory and logic model and make it difficult for the reviewer to understand what activities are actually conducted through the Program. For example, in the C&S Program Advocacy program theory document, link 17 states, "Industry advocates may file comments with the CEC and participate in CEC workshops and meetings." This outside activity affects the Program, but, as it is presented, the IOUs' participation in this activity is not clear.

While displaying how the Program interacts with outside entities provides useful documentation of these interactions, it does so at the expense of depicting sufficiently the actual theory for the core Program. Including activities external to the Program leaves very little room to show advocacy activities and the linkages. On the other hand, having the majority of Program activities combined into one activity, "Code Adoption Advocacy Activities," over simplifies the Program's efforts and does not adequately explain the actions that occur within the Program itself. Focusing the logic model and program theories on outside elements instead of core Program activities may result in the reviewer assuming the Program has a minimal effect on the code change process and reduces the ability of the program theory/logic model as tools to communicate effectively about the Program.

In both logic models reviewed, none of the long-term outcomes are shown as linked directly to C&S Program actions. Energy savings are the primary intended outcome of the Program and a critical metric of the Program's success, but their significance is less apparent because they are displayed as an effect of external activities and parties. This could lead reviewers to believe that the Program does not directly impact the outcomes listed.

Through interviews with Program staff and other stakeholders, the evaluation team obtained information about current Program operations and compared them with the program theories and logic models. For the most part, the program theories and logic models appear to accurately portray the C&S Program process flow. The lack of detail regarding the actual activities occurring within the Program, however, makes it difficult to determine whether inconsistencies exist in core Program elements. Due to the reallocation of activities between the EOA and CEP, most of the differences we were able to identify related to the new structure within these components.

The C&S Program is complex and the structure of the theories and logic models create additional challenges for reviewers to understand the individual components within the Program. The theory and logic model are, respectively, a set of explanatory notes and a visual representation of the model. While the notes explain the linkages within the visual model, the two components need to be viewed simultaneously to interpret the program theory. For example, the first activity box in the visual logic models, *Initial Measure Screening*, is associated with Links 2, 7, 9, 10, 28, 14, and 20 and each of these links has its own description. This makes it challenging to understand the linear progression of the program since the reviewer must read the corresponding description for each link to comprehend how elements interrelate. This structure creates additional intricacy for an already complicated program and may result in misunderstanding by individuals not involved in the Program about how savings are achieved.

Extension of Advocacy Activities

The EOA individual activities are not displayed separately, but are presented as one component of the overall Advocacy subprogram theory/logic model. Showing this as one activity does not provide enough detail to explain the logic behind the different activities within EOA. Without a more in-depth description of the EOA efforts, reviewers external to the Program may not understand the complexity of this part of the advocacy process. Also, the lack of information will limit the ability of evaluators to test program logic.

In the primary Advocacy subprogram logic model, the EOA appears as an umbrella for training, stakeholder outreach, and code enforcement support, which is consistent with how it. While all the IOUs consider the trainings to be a part of EOA, PG&E also includes stakeholder outreach and code enforcement support, but SCE and Sempra consider these activities to be under the Compliance Enhancement Program. It would be clearer if the logic model showed the EOA efforts as a part of a set of complementary activities, all developed to support improved compliance. These activities include the measure-based and role-based training under the EOA, the CEP, the Compliance Improvement Advisory Group (CIAG), and work on the Certified Energy Analyst (CEA) Exam.

A program theory/logic model focused on the complement of efforts to improve compliance would be useful to highlight the Performance Consulting Approach method that was used to develop all the compliance improvement activities. The method identified barriers to achieving a desired performance, and then developed strategies to overcome them. For the EOA, the process began with a scoping study followed by a more in-depth needs assessment. This led to development of the current EOA and CEP, the CIAG, and CEA support. The needs assessment was used to identify the specific training opportunities. The program theory could illustrate how

feedback from pre- and post- training testing and debrief surveys is used to inform ongoing improvements to EOA.

Other Documents

As a component of our evaluation we reviewed Web-based resources and documents related to the Program. Our team reviewed materials available on the Heschong Mahone Group (HMG) and the CEC Websites with regard to their accessibility, ease of use, and value to stakeholders. Our analysis of the Websites can be found in the *C&S Program Tracking and Documentation* section of Chapter 7. We also reviewed a sample of stakeholder event and CEC workshop materials (agendas, presentations, and meeting notes). The evaluation team did not do a full assessment of the content of these documents, but the materials reviewed appeared to be complete, informative, and well organized.

Program Savings Documentation and Reporting

The CPUC requested that Cadmus comment on the comparability of C&S Program energy savings reporting across the IOUs. The IOUs provided Cadmus with savings data for the Program as part of a concurrent impact evaluation we are conducting; our observations are based upon the savings data provided.

The C&S Program savings estimates that the IOUs initially provided were not reported consistently across the utilities because different templates and methodologies for estimating potential savings were used. The IOUs submitted two sets of data for the impact evaluation of the 2010 – 2012 program cycle, one for PG&E and the other for SCE, SDG&E, and SCG. To determine savings values, both submittals relied on a model that was derived from the Integrated Standards Savings Model (ISSM) that was created by Cadmus as part of the 2006-2008 impact evaluation. The model begins with estimated statewide savings for each code or standard and then makes adjustments to determine the savings for each of the IOUs.

The submittals were nearly identical in format, but the contents varied significantly due to differences in many parameters. These parameters included: assumed compliance improvements, measure life, interactive effects between electricity and gas, inclusion of a parameter accounting for "naturally occurring standards adoption,"[9] and undefined discount factors.

Although the models provided were similar, they used different values for statewide savings and for most other parameters as noted above. As a result, the impact evaluation team was unable to determine the savings being claimed for the program, and the logic behind the claims. Cadmus had to compile a second data request to ask the IOUs for a single number set for the statewide Program. The second estimate was provided, based on a single set of assumptions and common analytic approach.

An additional challenge was communicating about the savings values reported. The evaluators asked for claimed or reported savings and the IOUs responded that neither of those terms could be used to describe their response. Instead, the term "projected savings" was suggested by the

[9] This parameter was referred to as NOSAD in the prior Program impact evaluation and evaluators determined that it was not appropriate to include in determining evaluated savings.

IOUs and has been used to facilitate ongoing discussions with the IOUs about the results of the C&S programs.

6. Findings from Cost-Effectiveness Methods Review

During the evaluation's early stages, Cadmus was requested to investigate cost-effectiveness methodologies employed by the CPUC and CEC, as applied to assessing codes and standards. This chapter presents findings from that examination.

Introduction

The CEC must use a cost-effectiveness criterion when adopting a new building code or appliance standard. The CPUC has applied cost-effectiveness tests in its evaluations of IOU energy-efficiency resource programs. The C&S Program claimed energy savings for the first time during the 2006–2008 cycle, but the program activities were not subjected to a cost-effectiveness test. The 2010–2012 program cycle will be the first time the CPUC applies a cost-effectiveness test to the C&S Program.

If the CEC and CPUC used identical methods for determining cost-effectiveness, all codes and standards advocated through the IOUs' Program and adopted by the CEC would, by definition, be cost-effective. Our analysis shows, however, the CEC and CPUC employ significantly different cost-effectiveness methods, which make it uncertain whether a code or standard adopted by the CEC would be deemed cost-effective viewed through the CPUC methodology, and vice versa. Consequently, IOUs risk pushing for codes or standards adopted by the CEC, only to fail the CPUC cost-effectiveness test when the Program is later evaluated; or advocate for the CEC to adopt a code or standard meeting the CPUC test, but rejected by the CEC because it fails their test.[10]

In interviews conducted for this process evaluation, issues of conflicting cost-effectiveness methodologies were noted by CEC, CPUC, and IOU Program staff. In addition, under a new requirement, regulations adopted in 2013 or later, including CEC codes and standards, must be reviewed by the Department of Finance for cost-effectiveness. This may introduce additional criteria or considerations that the IOU C&S Program would have to account for in determining which codes or standards to pursue.[11]

Understanding methods used by the two organizations proves helpful to the IOUs as they decide which codes and standards to pursue. Additionally, characterizing the two methods can help identify implications of their differences, and point toward possible ways to harmonize their approaches.

[10] The latter situation is less likely to occur than the former, but it is a possibility under certain circumstances.

[11] SB 617 requires state agencies to review major regulations, and to consider how proposed rules would have "adverse economic impact affecting California business enterprises." It requires the CEC to submit a number of supportive analysis documents to the Department of Finance. The law applies to "major regulation" that will have an economic impact of $50M to businesses or individuals. The law will require California agencies to prepare a standardized regulatory impact analysis, as specified, with respect to the adoption, amendment, or repeal of a major regulation, proposed on or after November 1, 2013.

CEC Method

The California Public Resources Code requires the CEC to ensure adopted codes and standards do not result in added costs to consumers over the designed life cycle of the affected structure or appliance. The Warren-Alquist Act, which created the CEC and established its regulatory authority, states in § 25402.(b): "The standards shall be cost-effective when taken in their entirety, and when amortized over the economic life of the structure when compared with historic practices."

Thus, in the code adoption process, the CEC must apply a cost test considering the proposed change only from the consumers' cost perspective, but all changes to a building code must be analyzed as a group. For analysis, it is necessary to determine energy savings relative to the baseline efficiency of the appliance or measure, and then convert energy savings into dollars over the relevant lifetime of the affected appliance or measure. The only costs considered are incremental costs to consumers purchasing and maintaining the more efficient product. The analysis does not include CEC program costs or other costs.

Historically, the CEC used average retail rates to value energy savings. Starting in 2005, the CEC switched to the time dependent valuation (TDV) method for Title 24 building code measures. This method was adopted to better account for the added value of energy savings when avoided costs are high. This method basically incorporates time varying avoided costs (on an hourly basis), projected over the assumed lifetime of the product analyzed, along with a cost associated with carbon emissions, other factors, and an adjustment to align costs with rates to reflect the consumer's perspective.[12]

For appliance standards (Title 20), the CEC still uses average consumer rates instead of TDV adjusted rates. Thus, savings are valued as the same, regardless of when they occur. The CEC uses its own forecast of energy prices and rates in this cost-effectiveness calculation.

Both costs and benefits (value of saved energy) are calculated in net present value terms. To do so, streams of costs and benefits are calculated over the applicable time horizon, and each annual value is discounted using a specified discount rate.

CPUC Method

The CPUC evaluates the IOUs' C&S Program's cost-effectiveness based on the tests described in the California Standard Practice Manual[13] (SPM). The SPM defines the following five tests:

- Participant Test
- Ratepayer Impact Measure (RIM) test

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[12] To avoid presenting TDV values in economic units, and to allow consistent comparisons between subsequent codes and standards, the TDV calculation includes a step to normalize the value of energy savings, relative to a stream of natural gas costs. This is an artifact of the method, and has no instrumental effect on the comparison of the two methods.

[13] California Standard Practice Manual Economic Analysis of Demand-Side Programs and Projects, October 2001. http://www.energy.ca.gov/greenbuilding/documents/background/07J_CPUC_STANDARD_PRACTICE_MANUAL.PDF

- Program Administrator Cost (PAC) test
- Total Resource Cost (TRC) test
- Societal Cost Test (SCT)

The TRC serves as the predominant test the CPUC applies in evaluating programs. As the name suggests, its perspective is broader than solely the consumer: it accounts for impacts on both the consumer and utility. The TRC includes incremental consumer costs and, unlike the CEC test, utility program costs. This test typically provides a way to consistently compare costs and benefits of an energy-efficiency program with a new supply-side resource. E3 has developed spreadsheets to conduct cost-effectiveness calculations for the CPUC evaluations providing TRC, PAC, and RIM test results.

As in the CEC test, energy savings are calculated relative to a baseline efficiency level, but the way savings are valued differs slightly. The CPUC method uses the same stream of avoided costs and other cost components as the CEC Title 24 method, but excludes the retail rate adjustment. Consequently, the CPUC method provides a smaller value for Title 24 measures energy savings. This is consistent with the TRC test's different perspective. For Title 20 standards, however, it is not clear which approach might generate a larger economic value for energy savings, as the CPUC method takes into account the higher costs of energy on peak, whereas the CEC average-rate method currently does not.

Key Differences between the CEC and CPUC Cost-Effectiveness Methods

In addition to the differences noted above, the cost-effectiveness methods differ in a number of other ways, since the analyses take into account several other factors. Based on a comparison made by Jon McHugh, C&S program consultant, we provide the following summary of differences between the two methods:

- The CEC method focuses on economics of a single measure,[14] while the CPUC analysis focuses on energy-efficiency programs, which typically include multiple measures.
- Discount rate: The CEC uses a societal rate around 3% for appliances and a real, after-tax cost of capital for building owners for building codes. The CPUC uses a weighted average cost of capital (WACC) for each utility, which typically ranges from 8% to 9%.
    - Consequently, the CPUC discounts future savings (and costs) more heavily.
- Measure life: The CPUC uses measure lives defined in the Database for Energy-Efficient Resources (DEER), which have a maximum of 20 years. The CEC uses: 30 years for residential measures and nonresidential envelope measures; 15 years for other nonresidential measures; and the expected measure life for appliances.
- Savings definition. The CPUC requires savings be net (is adjusted for noncompliance, naturally occurring market adoption, and attribution to the IOU Program, per the latest

[14] As noted, however, the Warren Alquist Act specifies cost-effectiveness be determined for building codes in their entirety.

impact evaluation). The CEC method uses potential savings (as defined in the last impact evaluation), which are the product of unit savings times the number of new buildings or appliances covered by the code or standard.

- As a result, savings used in the CPUC method are less than or equal to CEC savings.

Observations

Though several CEC method factors tend to make it an easier test to pass, it is not possible to say with certainty that new codes or standards are more likely to pass one cost-effectiveness test than the other. The CPUC evaluating cost-effectiveness at the program level makes it possible for measures that pass the CEC test, but not CPUC tests at the measure level, to be part of a cost-effective package of measures based on the CPUC criteria.

Based on our analysis, the following observations can guide future actions regarding cost-effectiveness methods. Most significantly, no method currently is in place to appropriately assess the C&S Program's cost-effectiveness. The existing method, as embedded in the E3 calculator, gauges conventional programs, such as rebates or information programs. Consequently, it does not calculate energy saving benefits from a new code or standard for products or buildings added to the stock in future years. For example, the 2008 Title 24 affects all buildings constructed from then on; the life cycle stream of savings of all future buildings relative to the preceding 2005 Title 24 should be attributed to the IOU contribution to the 2008 Title 24, even after the next change to Title 24 has been introduced.

It is also likely that, over time, costs of compliance with a specific code or standard will drop, and any such change should be included in analyses of these future products' costs. In general, as energy-efficiency program measure incremental costs are usually determined relative to the cost of a measure just meeting code, it is important to ensure changes in incremental costs are appropriately captured for both the C&S Program and incentive programs.

The existing CPUC method uses DEER lifetimes, which are limited to 20 years. Many building measures last longer than 20 years; so limiting their lifetimes in the analysis diminishes their calculated cost-effectiveness. The CEC methodology recognizes building envelope measures will likely last beyond 20 years.

If net savings continue to be savings used in the CPUC cost-effectiveness calculations, it would be appropriate to adjust consumer costs to account for the same factors used to discount the savings. This is consistent with the treatment of benefits and costs in the conventional TRC method.

The Program Administrator Cost (Utility Cost) test applied to the C&S Program will likely show utility costs are far less per unit energy saved than they are for other programs. Consequently, the difference between the PAC and the TRC test results for the C&S Program will probably be significantly larger than the difference between the results of these two cost-effectiveness tests for typical energy-programs. This suggests that there may be merit in giving more consideration to the PAC test when evaluating the C&S Program, or expanding the TRC to include broader

societal benefits. This is consistent with recent suggestions to reexamine the usefulness of the PAC test in the assessment of efficiency programs.[15]

Finally, though it may not be feasible or desirable to totally align the CPUC and CEC cost-effectiveness methods since they inherently serve different purposes, developing consistent assumptions and inputs would be desirable, and would help narrow the differences. For example, applying the same measure lives, and using the same energy price forecasts, would eliminate two significant differences.

[15] For a variety of reasons, other authors (such as C. Neme and M. Kushler in a 2010 paper, "Is it Time to Ditch the TRC? Examining Concerns with Current Practice in Benefit-Cost Analysis" presented at ACEEE 2010 Summer Study) have suggested applying the PAC more broadly.

7. Findings on Program Processes and Operations

This chapter presents process evaluation findings regarding processes employed in and operation of the C&S Program. Findings are based largely on the interviews conducted during the study. We interviewed a broad set of stakeholders who were involved actively in the Program. Since many of the stakeholders were from the industries affected by new codes or standards, their responses were often colored by their reaction to being subjected to regulations. Our intent in reporting the findings from all the interviews is to minimize commentary based on views about regulations, but instead to emphasize substantive feedback that can inform process improvements.

Program Internal Coordination and Resources

Overall, our study found processes used to conduct the Codes and Standards Program were highly effective, and internal operations and coordination across the statewide team (the IOU Program staff and their consultants) were excellent.

Internal Coordination

All C&S Program staff, their consultants, and CPUC and CEC respondents reported coordination, communication, and collaboration among members of the C&S Program team have been effective. CEC respondents also reported the Program team operates effectively, and is well coordinated.

Program Staffing

Excepting PG&E Program staff, C&S Program staff and consultants reported staffing was adequate for completing tasks within the existing C&S Program. SCE benefits from having a matrix organizational structure, which allows the C&S Program (as well as other programs) to utilize employees across the organization, based on their expertise. The program staff interviewed at PG&E indicated their staffing is dedicated more to specific areas or programs, and reported their C&S Program effort is understaffed. Although consultants are leveraged to supplement the lack of internal staff, PG&E respondents said they would benefit from having additional internal employees dedicated to the C&S Program.

Most respondents felt, however, that if the Program had more staff, they could use it effectively to achieve much higher energy savings. Staff at all utilities pointed out that staffing levels were low relative to savings achieved by the Program. All agreed additional funding and staff would allow the Program to provide a deeper level of technical support, which would result in higher savings.

At each utility, new employees learn about the C&S Program through on-the-job training. Neither an official process for this nor a manual to train new staff on the Program exists at any of the utilities. A few staff members reported that, due to the variability in processes resulting from the significant differences between individual codes and standards, a standardized Program manual might not be very useful, but most agreed there was room for improvements in documenting Program processes.

Resources

C&S Program staff felt the C&S Program would benefit from a range of additional resources, with several Program staff noting that securing funding for the Program each cycle proved challenging. Specific suggestions for how additional funding could improve the program included:

- Enhancing support on Title 20;
- Expanding software capabilities; and
- Participating more in federal advocacy.

Currently, advocacy at the federal level is primarily done through coordinating with national groups, such as the Appliance Standards Awareness Project (ASAP) and American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE), but staff said, if Program funding were to increase in this area, a deeper level of advocacy could be achieved through testing, conducting market studies, and other activities to support federal rulemaking. Interviews with national laboratories contracted to DOE for the federal standard process confirmed the most useful contribution the California IOUs could make would be through conducting research and providing data to support the standard adoption process.

Although all interviewees within the statewide C&S Program team thought providing more resources to the C&S Program would be beneficial, several constraints were noted that could limit savings achievable relative to funding. For one, the CEC's budget remains very limited, especially for Title 20 efforts, which creates a bottleneck for the amount of codes and standards that can be adopted. Therefore, the C&S Program is constrained by the CEC's lack of resources.

All Title 20 and 24 staff respondents at the CEC agreed they could make effective use of additional resources to expand their activities, but their priorities for additional funding differed. Title 24 team indicated they would benefit most from additional resources for software development to assess compliance. Title 20 staff saw the most value in acquiring additional personnel, though they also indicated additional resources could be used to support software. Title 24 staff indicated adding staff was a challenge to do efficiently during a code cycle, due to the complexity of codes and the effort required to train new staff.

Several codes and standards advocates interviewed also recognized the shortage of resources at the CEC. One respondent indicated it seemed the CEC "tossed the ball" to the IOUs, acknowledging to stakeholders that the CEC did not have the resources to implement the codes and standards process effectively, and were looking to the IOUs for the needed support.

Portfolio Level Processes

The C&S Program has emerged as a major source of possible energy savings in the IOUs' portfolios, but it faces multiple obstacles within the IOUs. Several C&S Program staff members believe IOU management and staff outside the Program have limited understanding of how the Program functions. Although this issue varies somewhat by utility, several C&S Program staff stated they felt staff members in the Emerging Technologies and Energy-Efficiency Programs did not adequately understand the C&S Program's role. C&S Program staff mentioned they

believed utility staff in other programs sometimes felt the C&S Program produced "soft savings," or savings they viewed as not reliable or verifiable.

The C&S Program potentially can reduce savings opportunities of other programs, and other programs may see this as creating uncertainty for their own savings. The portfolio level managers stated they were working to reduce these barriers through better communication. One pointed out the issue is not that others do not understand the Program conceptually, but that they do not understand how the Program claims savings.

When the Emerging Technology and Energy-Efficiency Program staffs were asked about their understanding of the C&S Program, they understood its general purpose and role, but did not know the particulars of the C&S Program's actions or the timeline for all measures pursued for CEC rulemaking at a given time. The Energy-Efficiency Program staff acknowledged the C&S Program leads to reductions in savings of their programs, which creates challenges for energy-efficiency program planning. As considerable upfront costs are associated with designing energy-efficiency programs, if a measure is adopted into code, it will reduce the cost-effectiveness of an energy-efficiency program including that measure.

One energy-efficiency program staff member indicated a need for a product road map, outlining the path and timeline for a measure moving from an Energy-Efficiency Program to the C&S Program. For products likely to be adopted in code, Energy-Efficiency Program staff would like to have early notice; so they can better prepare to adjust their program.

Several Energy-Efficiency Program staff members noted a challenge faced with the C&S Program in that they believed there was often a push for new codes and standards for technologies that might not be ready for adoption. These staff said Energy-Efficiency Programs sometimes resist moving such measures to codes and standards, leading to reduced coordination between programs. Their view was that thought should be given to developing metrics to gauge whether measures and markets were ready for a new code or standard.

Based on our interviews, IOU planning and decision-making at the portfolio level can better optimize the integration between the C&S Program and other programs. Though some C&S Program staff members understand the continuum, consisting of the Emerging Technology, Energy-Efficiency, and C&S Programs, a strategic portfolio level approach has not yet been fully implemented. Coordination among the IOUs at the portfolio level on the most effective path for advancing individual energy-efficiency measures is also limited. Recognizing these issues, IOU program staff interviewed all reported they are currently working to enhance communication and strategizing across programs.

Another obstacle faced by IOUs is a lack of perceived opportunities for identifying external benefits for IOUs working to support codes and standards. One example is the lack (so far) of methods for associating customer relations benefits with the C&S Program. Utilities have been able to use traditional energy-efficiency programs to develop positive customer relations. With the limited external awareness of the C&S Program, and the lack of tangible customer benefits (such as incentives), the utilities have yet to create recognition by customers and others, such as legislators, of the benefits from their efforts to support codes and standards.

Thus, some C&S Program staff believe IOU portfolio managers view the C&S Program as a less beneficial efficiency approach than traditional energy-efficiency programs. Some C&S Program staff feel not having sufficient support from management impacts the budget provided to the C&S Program. Nevertheless, portfolio management staff interviewed reported the C&S Program served as an essential part of IOU portfolio-level program planning.

Overall, it should be noted that the C&S Program has existed as a resource program only since the 2006–2008 program cycle, and the 2009–2012 cycle will be the first time the Program will be incorporated in the financial risk-reward calculus implemented by the CPUC. Consequently, it is expected many portfolio integration issues remain to be resolved. While the Program is a relatively recent component of the portfolio, it is also likely to be the single program with the largest claimed savings. Given its significance in the portfolio, IOU portfolio managers are moving ahead to resolve how the C&S Program is integrated and coordinated with other programs.

C&S Program Tracking and Documentation

Internal and External Websites

The evaluation team reviewed the HMG and CEC Websites, and received comments regarding both sites during many interviews. The HMG Website houses internally focused materials for the Program supporting the Title 24 stakeholder process. The CEC Website serves as the primary external resource available to the public for information regarding California's energy policy and planning.

Our review and interview comments revealed the HMG-hosted site effectively supports Title 24 stakeholder meetings, providing: agendas, presentations, CASE Studies, and meeting notes. Using public search engines (e.g., Google, Yahoo), we found Title 24 presentations and memoranda on specific technologies easy to locate.

However, it was challenging to find documentation placing materials in the context of the Program or the California codes adoption process. For example, although the HMG site has a calendar of all 2013 stakeholder events, this was not identified in general searches for Title 24 documents, such as California, Title 24, and stakeholder input. It appeared in searches using specific Program terminologies, such as CASE, HMG, and California IOUs. In addition, while we could not find materials explaining stakeholders' opportunities, or overall codes and standards process for the 2010–2012 cycle, we found, using a general search, a presentation outlining the process for the 2013 cycle.

Our review of the CEC Website revealed documents supporting the 2010–2012 cycle were difficult to access using public search engines or search mechanism on the site. While some documents would appear in listings generated through public search engines, not all related documents appeared available. Furthermore, there did not appear to be a document outlining the IOUs' involvement or how stakeholders could become involved in the 2010 cycle.

The CEC site's naming protocol also made searching for documents challenging. Documents were named by the date and document type (e.g., 2011-06-10_Agenda.pdf), but did not provide information identifying the CEC process the document applied to, making it necessary to open

the document to identify it further. Stakeholders from all groups interviewed said document-naming protocols within this site were not very informative. Others said downloading documents from the site was slow.

While respondents thought C&S Program reporting and documentation efforts were generally sufficient, they identified several opportunities for improvements to the Websites and protocols used to identify and locate information. Four members of the C&S Program statewide team noted a need for consistent cataloging of research and advocacy for each code and standard across the statewide team, and a status tracking system so everyone could see progress made for individual codes and standards. Issues cited regarding the internal Website included: excessive uploading and downloading; version control issues; and documents appearing multiple times.

Respondents indicated having a protocol for file naming, uploading, and version control would be highly beneficial. In addition, one C&S Program interviewee suggested maintaining a master list of topics pursued and existing contracts statewide would allow better collaboration across the team.

The external stakeholders had few comments regarding the HMG Website. The comments they had resembled those of the Program team. One advocate, extensively involved in the processes, noted information was missing from the HMG Website, was not well organized (e.g., residential and nonresidential information were not differentiated), and documents would not show up in searches using public search engines and were, therefore, inaccessible if participants did not have the actual Web address. It also was suggested documents be named using a consistent protocol, identifying critical information (e.g., topic, date, type of content).

Most EE and ET Program staff interviewed used the C&S Program and CEC Websites, though none said they did so regularly. Rather, most program staff go directly to C&S Program staff to obtain documentation and necessary information about codes and standards activities. Some staff from other programs recommended other IOU programs have access to interim findings and other information, not regularly available to the public on the Program's Website.

CASE Study Reports

C&S Program staff and their consultants reported the CASE Studies have evolved over the code cycles, and thought the current level of documentation was very good. With these recent improvements, both CPUC and CEC staff agreed the CASE Study process had improved, and was very effective. CEC staff working on both Title 20 and 24 indicated they appreciated the quality of the reports.

All codes and standards advocates and several industry stakeholders acknowledged the CASE Studies served as an essential part of the codes and standards process. However, Title 20 and Title 24 stakeholders reported different experiences with the CASE Study development process. Overall, Title 24 stakeholders' comments tended to be more positive than Title 20 stakeholders.

For instance, Title 24 stakeholders said, in general, they could provide feedback and contribute to CASE Study development, while almost all Title 20 industry stakeholders said they had little opportunity to contribute to development of CASE Studies. In addition, almost all Title 20 industry stakeholders (but only one Title 24 stakeholder) thought data in the CASE Studies were

often incorrect, based on old sources, or generated from testing of out-of-date products. These respondents said this led to discrepancies about estimated costs for industry to meet new code requirements as well as discrepancies for projected energy savings.

For instance, a Title 20 industry stakeholder involved in the battery charger standard said the CASE Study only factored in costs of parts, but not costs to redesign, recertify, and retest products. Another Title 20 stakeholder noted market data in one CASE Study claimed sales for one product group at about 20 times the actual number of units used in the state.

These respondents also expressed dissatisfaction with a lack of transparency regarding data origins and the basis for recommendations. Several participants in the Title 20 battery charger process stated it was difficult to assess the CASE Study research because data were only provided at a summary level, and consultants did not provide supporting documentation.

Notably, Program consultants involved in the battery charger proceedings held a different view. They indicated they had taken steps to address industry concerns, such as performing tests to determine whether industry stakeholder claims could be substantiated, and providing countervailing evidence from their tests. They also said they had designed hardware to meet requirements some industry members said could not be met.

Four Title 20 industry stakeholders (three involved in the battery chargers standard and one involved with set-top boxes) expressed varying concerns about sharing data with IOUs and their consultants for use in the proceedings, and how they would be used. Three noted concerns about the public nature of data provided to the IOUs. One said they could not share cost data for competitive reasons, but said sharing other types of data would be acceptable. Another stakeholder had provided information directly to the CEC, and had no problems doing so. A Title 20 advocate noted some industry stakeholders had presented confidential data directly to the CEC under a non-disclosure agreement (NDA), and received useful feedback. Another said his firm had not been asked for data, but would probably have provided it had an acceptable NDA been arranged.

Two Title 20 industry stakeholders not involved with battery chargers said they had no data-sharing concerns. Another stakeholder said they could not share data about future products, but sharing data on current products was fine.

The public nature of the rulemaking process presents a dilemma of significant concern for the IOUs. For example, in the battery charger proceedings one standards advocate commented that, if industry shared data with the CEC, and the CEC, in turn, shared it with the IOUs or their consultants, it would have to be made public. This hesitation suggests that if there is no way for the CEC to share and protect the confidentiality of industry data, the IOUs cannot review and use data to update the CASE Studies; however, the CEC would have access to the data in their decision-making process meaning their decision to adopt a code or standard proposed by the IOUs might rely on information that is not publicly available. The disconnect between the totality of information that the CEC considers during the rulemaking process and the portion of that information reflected in the CASE studies opens the IOUs and their consultants to criticism that they relied on incomplete or outdated data.

One of the most common CASE Study issues, identified by at least half the Title 24 and Title 20 industry stakeholders (primarily those not involved in the battery charger standard), was the view that CASE Study consultants did not have enough knowledge about the interaction between technologies and the industries and businesses involved. One specific issue raised by several stakeholders was that the CASE Studies focused on high-volume technologies, without looking at the entire product category affected.

The majority of Title 20 and one-half of Title 24 industry stakeholders indicated they would like to be involved earlier in the process. Title 20 stakeholders suggested the IOUs should approach industry before starting the CASE Study research, either because stakeholders could help the utilities and their consultants design better studies, or could help the IOUs identify the most fruitful areas for pursuing CASE Study research. Title 24 stakeholders said earlier involvement could help reduce industry opposition later in the process. Program staff expressed mixed thoughts on this topic, with some saying earlier stakeholder involvement might be effective for some product types, but others saying the industry would take advantage of this process to prepare their arguments against the standard.

Program Goals and Metrics

Our interviews suggest further work must be done to establish more meaningful goals for the C&S Program and in communicating those goals to stakeholders. The existing Program Performance Metric (PPM) is based on the number of CASE Studies developed, where codes and standards adoption by the CEC is anticipated. Some C&S Program staff believed this performance metric for Title 20 and 24 Advocacy could push the Program to prepare a larger number of CASE Studies, when, in fact, it is often more efficient to bundle related measures into a single CASE Study rather than separating them. Adhering to this metric could lead to unnecessary inefficiencies in the process.

Based upon respondent interviews, many industry stakeholders do not understand the C&S Program's true goals. The majority of Title 24 industry stakeholders indicated they felt the goal of the C&S Program and IOUs was simply to pass more energy-efficiency regulations, without regard for actual energy savings achieved or how regulations would be implemented in the real world.

Several industry stakeholders involved in Title 20 and Title 24 commented they felt savings pursued through the codes and standards process seemed quite small for the effort required on the part of the industry to respond. The majority of industry stakeholders involved with Title 24, and several involved with Title 20, felt greater real energy savings could be achieved if existing regulations were fully implemented and enforced. The majority of Title 24 advocates and industry building code stakeholders felt the short time between new Title 24 codes did not allow the industry and code officials to learn how to meet and enforce them to achieve desired compliance levels.

Broader strategic planning goals, such as those established by AB1109, AB32, and Zero Net Energy,[16] also influence the program. CEC and C&S Program staff reported these goals to be quite aggressive and difficult to achieve. Although codes and standards are a critical element of meeting these goals, their adoption is under the purview of the CEC. IOUs may support and influence this process, but adoption of codes and standards is ultimately the responsibility of the CEC. However, as will be discussed later in this report, there are limits to the CEC's ability to pursue highly aggressive codes and standards.

IOUs acknowledged these challenges, and addressed them by strategizing on components within their control. For example, to respond to AB1109, Program staff reported they prioritized Program advocacy to support a lighting efficiency strategy designed to most effectively satisfy broader state goals.

Several respondents noted the lack of a clearly defined baseline for the state's goals established in the Energy-Efficiency Strategic Plan makes it impossible to measure progress toward the goals, and to develop a more systematic approach to reach them. For the various entities involved in energy-efficiency efforts in the state, this makes it very difficult to gauge the amount of change required, and interferes with efforts to collaborate and plan effectively. The CEC and CPUC have worked to implement the state's Strategic Plan through separate action plans with separate goals. These organizations have acknowledged the need for better coordination, resulting in recently enhanced coordination efforts between the two agencies.

[16] AB1109 requires reducing: "average statewide electrical energy consumption by *not less than* 50% from the 2007 levels for indoor residential lighting and *not less than* 25% from the 2007 levels for indoor commercial and outdoor lighting by 2018." AB32 goals will require approximately a 29% cut in 2020 greenhouse gas emissions levels projected in 2007. The Zero Net Energy (ZNE) goals are for all new residential construction in California to be ZNE by 2020, and all new commercial construction to be ZNE by 2030.

8. Findings on External Communication and Coordination

Implementing the C&S Program successfully requires effective communication, coordination, and interactions, both with other IOU staff and programs and with outside parties. This chapter provides findings on types of communication and coordination required, including a discussion of how schedules of various activities relate to the Program. Information and findings primarily have been based on our interviews with the full range of stakeholders.

Coordination and Interactions with IOU Emerging Technology and Energy-Efficiency Programs

As illustrated in Figure 1, the IOUs view the C&S Program as part of a cyclic process that advances the energy efficiency of products and buildings. Key linkages are required among the Emerging Technology, Energy-Efficiency, and C&S Programs.

While communication and coordination between the C&S Program and other IOU programs primarily was viewed positively by the Emerging Technology and Energy-Efficiency Program staff interviewed, they cited opportunities for improvements. Most Energy-Efficiency and Emerging Technology programs communicated with the C&S Program through informal discussions and meetings. Typically, one staff member within the Energy-Efficiency or Emerging Technology Program served as the primary contact point between programs, and was familiar with the C&S Program's activities.

Most Energy-Efficiency and Emerging Technology program managers indicated they would favor more regular communications about C&S Program activities, especially regarding new measures listed as priorities for codes and standards. However, many program staff members interviewed cautioned against over-communication in this area, feeling there had to be a simple way to communicate what the C&S Program was working on. Generally, the other programs' staff recommended more frequent meetings, and a monthly newsletter from the C&S Program, outlining activities and timelines by measure. They also indicated the C&S Program should continue to identify opportunities to share resources and studies with the Energy-Efficiency and Emerging Technology programs.

C&S Program staff indicated their communication efforts with the Energy-Efficiency and Emerging Technology programs varied. SCE took a proactive stance in educating other program staff about the C&S Program and codes and standard being pursued. PG&E typically communicated with Energy-Efficiency and Emerging Technology program staff as needed, when they knew an overlap would occur. Both utilities worked towards improved communication with other programs, and portfolio level managers helped to coordinate this. Several interviewees suggested developing a cross-functional group between IOUs to help facilitate coordination at upper management levels would be helpful.

Coordination and Interactions with Outside Entities

The Program regularly interacts and coordinates with outside entities, such as the CEC, the CPUC, DOE, codes and standards advocates, and industry groups. Program relationships with each of these groups depend on each party's role in the process.

Coordination and Interactions with the CEC

Most CEC staff believed the IOUs' C&S Program served an important role in the overall codes and standards process, and acknowledged that, without the IOUs' ongoing advocacy, it would be difficult to adopt codes and standards at the level currently being adopted.

Based on our interviews, the working relationship between the C&S Program and the CEC has both positive and challenging aspects. C&S Program staff reported communication with CEC staff was generally very productive throughout the advocacy process. They felt the CEC usually kept them well informed. CEC staff interviewed also stated that communication with the IOUs was very effective overall. Both Title 24 and Title 20 CEC staff agreed C&S Program involvement was productive, and felt the Program's advocacy efforts were useful in responding to industry concerns.

C&S Program staff, however, mentioned situations where the CEC lessened support of individual codes or standards after significant advocacy work had been conducted by the IOUs. They said industry pushback was a major driver of these changes in the CEC's levels of support.

CEC Title 24 staff indicated that, though they were not required by statute to address all industry concerns in adopting a code, they felt these concerns were important for the CEC to consider. CEC staff emphasized the need to take into account information presented by both advocates and opponents in the codes and standards adoption process.

Respondents pointed out another factor complicating this issue being that as appointees of the Governor, Commissioners take into account broader considerations, and act as independent decision makers; thus, CEC staff cannot always anticipate what Commissioners will decide.

Interactions with C&S Advocates and Affected Industry Groups

Advocates for Title 20 and Title 24 clearly understood the IOUs' role in the codes and standards process, but this was generally less clear to the industry stakeholders. Although most industry stakeholders for Title 20 and 24 understood the IOUs supported the development of the CASE Studies, only a few indicated they understood the IOUs' motivation for pursuing energy savings through codes and standards, and many also noted the IOUs' role in the process was unclear.

Several Title 24 industry stakeholders commented that, although IOUs played a crucial role in the adoption process, the IOUs had their own agenda, which sometimes conflicted with that of other stakeholders, making it difficult to work together constructively. One stakeholder wondered why the utilities were not more visible as the consultants were, and thought their role and distinction from the CEC should be clarified.

While Title 24 industry stakeholders reported interacting a great deal with the IOUs, Title 20 industry stakeholders reported having little direct contact with them. The CEC did not permit IOUs to host meetings or workshops for Title 20; so there were fewer opportunities for

interaction with these stakeholders. Only one Title 20 industry stakeholder said he had interacted with the IOUs outside of the CEC workshops, and the IOUs' role seemed less well-defined to these stakeholders.

Coordination and Interactions with DOE

Program staff and consultant interviewees reported that advocating for federal standards proved challenging, and faced many unknowns. Program staff currently do not have a relationship with the DOE staff that allows informal communications throughout the process.

According to interviews, *ex parte* rules have limited the C&S Program's opportunities for interactions with DOE on federal appliance standards. Being DOE standards are implemented nationally, a larger number of affected industries and advocates are involved in the process than in California Title 20 proceedings. Typically, the C&S Program coordinates with national advocacy groups, such as ASAP and ACEEE, in their advocacy efforts. DOE holds public rulemaking meetings, at which DOE and its consultants present to interested parties the process used to analyze the standards. Stakeholders, such as the California IOUs, can receive advance permission to present at these meetings, but their ability to interact directly with DOE has been limited.

All interviewees involved in the federal standard process agreed the best way for the IOU C&S Program to influence the federal process was to supply data to support the utilities' positions. DOE and their consultants currently do not conduct first-hand data collection; so, in considering standards for a new product type or updating existing standards, they solicit data from outside parties. The degree that DOE relies on outside parties for data depends on the amount of information DOE already has on the product types. Data used in its analysis are referenced in public dockets. Involvement in public meetings is also transcribed, and included in these dockets; so these documents provide a useful resource for determining attribution of standard adoption to different parties.

Federal comment periods usually last 30 to 75 days, but timelines often change, making it difficult for IOUs to plan research to support their position on federal standards. During this short window of time, Program staff and their consultants conduct research and develop comment letters in response to proposed rulemaking. One C&S Program consultant voiced concerns DOE did not respond to all comments submitted. However, an interviewee involved in the federal process stated DOE did respond to all valid comments received, and recorded comments received and their responses in publicly available dockets. This respondent noted similar comments were often combined, and, at times, DOE could not address comments due to lack of data, which might explain the Program consultant's observation.

Schedule and Timeline Challenges

In addition to coordinating its efforts among IOUs, the C&S Program must deal with regulatory scheduling issues from three disparate agencies: the CEC, CPUC, and DOE. The following sections describe some of the scheduling challenges the C&S Program has encountered in working with these different entities.

The CPUC Program Cycle

The CPUC developed the statewide Energy-Efficiency Strategic Plan in conjunction with other organizations, and oversees funding for the statewide Codes and Standards Program. Funding is provided over specific portfolio cycles, the latest of which is the current 2010–2012 cycle. This schedule is a major driver of the C&S Program planning. The C&S Program has also taken the California Energy-Efficiency Strategic Plan into account in program planning, as documented in the PIP for the 2010–2012 cycle.[17] For example, current IOU actions identified in the C&S Program PIP are geared to near-term strategies for 2009–2011. Mid-term (2012–2015) strategies outlined in the Strategic Plan either complement or extend and deepen the near-term strategies, but they are not a part of the current C&S PIP.

Since the first draft of this report was prepared, the CPUC has elected to establish 2013-2014 as a two-year transition period during which the IOUs can make incremental program changes in anticipation of the next full program cycle starting in 2015. In addition to having an impact on the timing and development of action steps to support the latest iteration of the Energy-Efficiency Strategic Plan, the decision affects C&S Program efforts already underway to reserve current portfolio cycle funds for CASE Study research that might extend into the next portfolio funding cycle. This has been another important Program planning activity affected by the CPUC schedule.

The CEC Rulemaking Cycle

As stated in the C&S PIP, the principal audience for the Codes and Standards Program is the CEC; so the CEC rulemaking cycle is a driver of C&S Program activities and schedule. The CEC conducts periodic rulemakings, usually on a three-year cycle, for building regulations and, as needed, for appliances. These revisions to Title 20 and 24 include updates to existing regulations, and development of new regulations for new technologies and measures. As this evaluation was being conducted, the CEC recently completed a Title 20 rulemaking for battery chargers, and was in the adoption process for another Title 24 update. Each rulemaking includes a timeline specifying when the code or standard would be officially adopted, and when it would go into effect. Any deviations occurring in the timeframe, between when a regulation is adopted and when it is anticipated to become effective, impact the C&S Program schedule.

The latest rulemaking for Title 24 was in its final stages in May 2012, with changes scheduled for adoption in June 2012. Actual implementation for Title 24 code changes was not scheduled until January 2014. In the view of interviewees, this should allow ample time for post-adoption activities, such as compliance manuals and software development, as well as time for the California Building Standards Commission (CBSC) Publication process, and the mandatory 180-day waiting period following publication.

The 2011 Appliance Efficiency Regulations (Title 20) were adopted by the CEC in January 2012. They covered a broad range of battery charger systems. Title 20 implementation dates

[17] *California Long-Term Energy-Efficiency Strategic Plan.* California Public Utilities Commission. 2008. http://www.cpuc.ca.gov/NR/rdonlyres/D4321448-208C-48F9-9F62-1BBB14A8D717/0/EEStrategicPlan.pdf.

varied, depending on affected product types. According to a letter dated January 27, 2012,[18] sent by the CEC to battery charger system manufacturers, the effective dates for specific products ranged from February 2013 to January 2017.

According to C&S Program staff and consultants, wide variations in effective dates for Title 20 and Title 24 affect C&S Program planning. These variations require C&S Program staff to maintain awareness and knowledge of current rulemakings and implementation schedules. The staff also must remain up to date with CEC planning for the next rulemaking cycle, and factor this into Program planning.

U.S. DOE Rulemaking Cycle

As another C&S Program Implementation Plan element, the Program seeks to influence DOE in setting national energy policy impacting California. The DOE has developed a comprehensive, multiyear, rulemaking schedule, which currently extends through 2015. DOE's Appliances & Commercial Equipment Standards Website[19] indicates all established federal standards rulemaking schedules can be found in the DOE Multi-Year Program Plan document, dated October 2010. This document also contains a history of DOE rulemakings. This history details the statutory requirements DOE's rulemakings must take into account. Requirements include elements of:

- The Energy Policy and Conservation Act (EPCA);
- The Energy Policy Act (EPAct) for 2005;
- The 2007 EPAct; and
- The Energy Independence and Security Act (2007).

Among other things, the history describes DOE's recent successful efforts to address a multiyear rulemaking backlog

DOE significantly accelerated the adoption pace for new final standards between January 2009 and July 2010, and anticipates having the resources and flexibility to pursue additional opportunities beyond their legal requirements. A well-defined schedule was set forth in the Multi-Year Program Plan for all products subject to future rulemakings by DOE, and DOE has stated it intends to accelerate the schedule, and add newly covered products whenever possible.

As cited in the C&S PIP, strategy 1-4 of the CA Energy-Efficiency Strategic Plan is to: "Improve coordination of state energy codes and standards with other state and federal regulations."[20] The C&S PIP has developed several Appliance Advocacy Action Strategies in response, one of which is to continue developing appliance standards prior to DOE preemption.[21] While the

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18 "Letter to Battery Charger Manufacturers." California Energy Commission. 2012. http://www.energy.ca.gov/appliances/battery_chargers/documents/2012-01-27_Battery_Charger_Manufacturers_Letter.pdf.

19 "Appliances and Commercial Equipment Standards." U.S. Department of Energy. 2011. http://www1.eere.energy.gov/buildings/appliance_standards/.

20 *2010 -2012 Energy-Efficiency Plan.* Southern California Edison. 2011. 711.

21 Ibid. 711.

published rulemaking schedule provides a basic roadmap and sense of direction, DOE activities at times deviate from it. C&S Program staff indicate they must, therefore, continue to monitor DOE activities and coordinate as closely as possible with the schedule and activities to continue influencing the appliance market prior to preemption by DOE.

Timeframe for Contractor Involvement

Some interviewees outside the Program cited concerns about when IOUs brought contractors on line to assist with C&S Program efforts. During the most recent cycles, the IOUs and CEC developed codes and standards "wish lists" separately prior to collaborating to establish priorities for codes and standards adoption. The lists included new codes and standards and enhancements to existing codes and standards based on new proposals from the IOUs, CEC, and stakeholders, and concepts carried over from previous code cycles.

The IOUs hired consultants to assist in developing their initial list. They then selected codes and standards consultants early in the adoption process before reaching agreement with the CEC on codes and standards that should be pursued. Though early involvement by contractors allowed the IOUs to move quickly in pursuing codes and standards opportunities, several parties interviewed, including external stakeholders and CEC staff, believed there were downsides to the process and timing for selecting contractors. These included:

- Reduced flexibility for the IOUs to change which codes and standards they focused on later; and
- Perceived mismatches between the expertise of the contractors and the codes and standards eventually pursued.

Code Adoption, Program, and Evaluation Cycles

CEC and CPUC schedules created challenges in several ways for the C&S Program. Some related to the process through which the C&S Program could claim energy-savings credits. The C&S Program does not begin producing savings until after advocacy occurs, and continues generating savings well into the future. This time lag makes it more challenging for the Program to communicate to outside parties the linkage between Program activities and energy savings. The IOU Program staff noted that waiting several years to do interviews for attribution in the impact evaluation limits the completeness of information respondents can recall, and could negatively influence the attribution analysis.

As the CEC code cycle does not align with CPUC EE program year cycles, it can be challenging to determine how to attribute savings between program cycles. This situation can be aggravated in cases where the CEC delayed adoption of a code or standard for which IOUs had advocated. Though the CEC might eventually adopt the code or standard, IOU Program staff are concerned they would not be able to claim savings during the originally anticipated evaluation cycle, and could fall short of their expected progress in meeting savings goals.

Several interviewees said resource demands imposed by the code cycles' schedule presented a challenge. It would be ideal for IOUs and CEC to have time to plan for the next cycle, but, having no gap between cycles, meant the CEC and C&S Program both were wrapping up the current cycle when needing to start dedicating time and resources to begin the next cycle. This

overlap made it difficult to handle all tasks necessary to keep the codes and standards cycles on their planned schedules.

Some industry stakeholders noted a time period should be built into the process to allow recently adopted codes and standards to take effect, providing an opportunity to identify and remedy problems with the latest codes and standards. These stakeholders commented that not allowing this adjustment period could result in resources wasted from pursuing inappropriate codes and standards enhancements, and stakeholder fatigue from jumping too quickly into the next round.

Energy-Efficiency program staff also commented on problems created by the CEC code cycle and CPUC cycles. Some felt the cycles were too short to adequately test and demonstrate a measure was ready to be adopted as a code or standard. As illustrated earlier (in Figure 1), the theoretical path for an efficiency measure includes identification and testing through the Emerging Technology program; then demonstration and market preparation in the Energy-Efficiency program; followed by adoption as a code or standard. In practice, however, Energy-Efficiency program staff felt CEC and CPUC timelines did not allow sufficient time for a measure to move through this path. Rather, the C&S Program and Energy-Efficiency Program often worked on a measure concurrently. When this occurred, the Energy-Efficiency program had what they considered to be an inadequate, 18-month window to assemble a program to support and prove a technology before it became a code or standard.

9. Findings on C&S Decision-Making Processes

This chapter presents findings regarding: the decision-making process used to select codes and standards to pursue; the adoption process; and how it is influenced. Decisions include those made by the CEC, as well as the IOUs. We interviewed C&S Program staff, Program consultants, CEC staff, industry stakeholders, and codes and standards advocates to inform our findings.

Approach for Selecting Codes and Standards to Prioritize

IOU staff report they have focused on promoting codes and standards to achieve large energy savings; they have felt driven by the Zero Net Energy goals, which they believed would not be achieved without aggressive codes and standard efforts. Although CEC staff also said their codes and standards efforts were driven by state goals, they reported that their legislative mandate established rigid cost-effectiveness tests that may act as limiting factors on their ability to pursue highly aggressive codes and standards.

CEC staff reported resource constraints also limited the codes and standards they could pursue; so they focused on the ones that would have the greatest impact on savings and broadest industry applications. Title 20 receives fewer resources than Title 24; so this has restricted the number of appliance standards the CEC has had the bandwidth to pursue.

This past code cycle, the C&S Program and CEC developed a statewide approach for selecting which codes and standards to pursue. At an early point in the process, the CEC and IOUs each developed lists of potential measures for codes and standards, and then met to discuss and develop a common list of priorities. Although this process worked well, both parties agreed having discussions even earlier could have helped prioritization.

The process for selecting federal standards to pursue differed. The CEC was not involved, and, because California IOUs had less presence at the national level and limited influence, the C&S Program proved largely reactive rather than proactive. For federal standards, the Program primarily followed all new rulemakings, coordinated with other organizations, and provided advocacy in a few targeted areas.

Influencing the CEC's Codes and Standards Process

C&S Program Influences on CEC Decision-Making

Based on our interviews, the C&S Program has clearly had a significant influence on codes and standards adopted by the CEC. The technical, economic, and market data provided in the CASE Studies has been very influential in several rulemakings, and the CEC acknowledged they appreciated the quality of information and the roles that information played. Though CEC staff expressed some frustration at what they considered to be the IOUs' "purist" focus on maximizing energy savings, they appreciated the C&S Program brought resources into the process to counterbalance industry opposition, allowing the CEC to seek compromises that led to adoption of tighter codes and standards.

C&S Program staff felt the CEC had been clear about the explicit factors considered in codes and standards decision making, but felt other factors they could not anticipate affected the CEC's decisions. These included pushback from industry stakeholders, and differences between positions taken by Commissioners and CEC staff.

CEC's resource constraints also affected the Program's ability to influence codes and standards outcomes. This has been particularly challenging with Title 20, and has been compounded by staff turnover the Title 20 team has experienced, making it difficult for IOUs to anticipate support levels for different standards during this past cycle. This problem has been less apparent with Title 24, as the CEC Title 24 team has experienced less turnover, and has more experience. In addition, CEC Title 24 team members have been more receptive to IOU involvement in the adoption process, including a positive disposition to IOUs' hosting stakeholder meetings (as discussed below).

Stakeholder Influence

Stakeholder Interactions with C&S Program

Two out of seven Title 24 industry stakeholders and almost all thirteen Title 20 industry stakeholders were concerned about resource and timing constraints that hindered their ability to contribute data to the CASE Studies. Both sets of stakeholders noted that, since the data and analysis required by the Program were not something they normally produced, their organizations lacked the resources to provide them in the given time. One Title 24 industry stakeholder from a large manufacturing company pointed out that, for industries with hundreds of thousands of combinations of a product type, it proved especially challenging.

Several Title 20 industry stakeholders reportedly felt data they provided were ignored by the IOUs, or reportedly were told they were too late in the process for it to be considered. One Title 20 advocate noted that, on occasion, although the CEC had the IOU CASE Study, it was not posted in advance of the CEC workshop; so stakeholders could not review it prior to the workshop. Stakeholders indicated they would prefer to have materials posted as far in advance as possible, and, when updated, have changes made clearly visible.

C&S Program staff, Title 24 consultants, and the CEC Title 24 team found the IOU-hosted stakeholder meetings useful. The cited benefits of IOUs hosting the meetings included:

- A more informal atmosphere, encouraging more open and constructive information sharing than a CEC-hosted event might; and
- An opportunity for IOUs to receive direct feedback from industry on their CASE Studies; so they had been vetted by industry when code changes were proposed for rulemaking.

A shortcoming cited regarding this first round of such meetings was many key stakeholders did not participate because they did not recognize the meetings as a key part of the codes and standards process. Respondents thought this was a one-time problem since, after this last code cycle, stakeholders better understand the process and benefits of IOU involvement in hosting these meetings.

Though Title 24 stakeholders participating in stakeholder meetings found them effective, overall, they pointed out several issues to be addressed. Many stakeholders stated the meetings needed a wider range of industry attendees, and several specifically indicated the input of professionals working in actual construction needed to be represented. Some stakeholders indicated they would have liked to have been involved earlier in the IOU-hosted meetings, but did not know of them. Several said only holding certain meetings in Northern California made it challenging for stakeholders in other areas to attend in person. Those attending by Webinar said they felt they could not participate as well as they could in person.

Stakeholders also reported the IOU stakeholder meeting materials were being revised right up until the meetings started, making it challenging for stakeholders to prepare. One said more than 90% of the CASE Studies were updated the day of the meeting. Several industry stakeholders said they did not think enough time passed between the last stakeholder meeting and the CEC hearing to allow the CEC to take the meeting into account. Stakeholders involved in multiple processes mentioned additional issues. They said it was difficult to stay up to date and to schedule effectively, given the large quantity of materials, the lack of summary information, and the lack of a master schedule of meetings.

Stakeholder Involvement in Overall Process

From stakeholder interviews, responses of Title 24 stakeholders were generally more favorable than those of Title 20 stakeholders regarding the overall codes and standards process. Some of this difference probably could be attributed to the nature of the affected products and industries. Differences also occurred, however, in how the processes were implemented, which could have led to dissimilar views.

In general, comments regarding the Title 24 process indicated stakeholders were involved earlier in the process than Title 20 industry stakeholders. The IOU-sponsored stakeholder meetings held for Title 24 provided an opportunity, not available in the Title 20 process, for industry stakeholders to provide input. When asked about having IOUs sponsor stakeholder meetings, CEC Title 20 staff said such meetings would not be effective for appliance standards, and, unlike the Title 24 staff, they questioned whether IOU-sponsorship of such meetings was appropriate, due to potential misperceptions among stakeholders. Consequently, the IOUs did not sponsor any Title 20 meetings so stakeholders could not provide input to the C&S Program through such IOU-sponsored meetings.

The majority of Title 20 and half of Title 24 industry stakeholders interviewed expressed frustration that they had not known how to become involved early enough in the codes and standards development and adoption process. Title 20 industry stakeholders interviewed particularly felt affected by this, with most indicating they would have liked to have known about and been involved when CASE Studies were being developed. The majority of industry stakeholders suggested having an opportunity for industry to be involved earlier in the process would reduce opposition. The majority of advocate and industry stakeholders interviewed felt providing comments at the CEC workshops was too late in the process to have any effect.

Stakeholders generally agreed that it was desirable to follow multiple paths of involvement in the CEC codes and standards process. They indicated that attending CEC workshops, coupled with having individual meetings and communications with CEC staff, offered the most effective way

to participate in the process. Several Title 20 stakeholders referred to personal meetings they arranged with CEC staff, independently of the public workshops, saying these individual meetings often were more productive than the workshops. Other interviewees noted the value of communicating directly with Commissioners during the process.

Rate of Code and Standard Adoption

The general consensus among C&S Program staff and consultants was that codes and standards were not being adopted quickly enough, and the CEC should be more ambitious in their adoption. One staff member reported a decline in the pace of code adoption in California caused the state to lose its position as the leader in building codes and standards (e.g., there are concerns ASHRAE 90.1 may soon be more stringent than Title 24). They expressed similar concerns about slow progress with Title 20 standards. Many Program respondents—and one Title 24 advocate—voiced concerns about meeting legislative goals dictated in the Energy Efficiency Strategic Plan, including Zero Net Energy and AB1109 requirements, at the rate codes and standards were currently being adopted.

On the other hand, CEC staff generally thought codes and standards were being adopted at a sufficient pace. One CEC respondent pointed out there were still two more code cycles until 2020, the target year for achieving many of the state goals (including ZNE for new residential construction).

Many industry stakeholders, however, thought the pace was too fast, and that it was having negative consequences for adoption and implementation. Several Title 20 industry stakeholders commented the standards often encompassed such a large scope of products that industry could not address all aspects needed to be considered in the timeframe allotted. They also noted it was challenging to provide data to the CEC within the allotted timeframe because these were not something they normally produced. The majority of Title 24 industry stakeholders indicated code adoption rate negatively affected compliance.

10. Findings on Extension of Advocacy

This chapter presents process evaluation findings specifically regarding EOA activities. It first discusses findings about processes being implemented, and then presents an analysis of training participant survey data.

Extension of Advocacy Operations

Title 24 EOA

To date, most EOA efforts have been dedicated to Title 24. The EOA is managed collectively by staff from each IOU, through weekly phone calls with a PG&E staff member, who serves as the official project manager. All IOU staff noted this structure had been very effective thus far. Although collectively managed, each IOU has implemented the EOA activities within its territory independently, with its own budget. No documentation was available on the EOA management structure, and the EOA staff agreed their relationship and trust in each other proved key to the EOA's effectiveness and ability to operate informally. They also agreed, however, that the arrangement might not work as well with different staff, and documenting the protocol would be a good idea.

IOU interviews revealed they not only implemented EOA independently in their service area, but activities they categorized as falling within the EOA differed. PG&E categorized EOA activities as support given to CIAG and California Association of Building Energy Consultants (CABEC) on the CEA Exam as well as all measure-based and role based trainings. Sempra and SCE, on the other hand, only included training activities under EOA, and housed the other activities under the CEP.

IOU staff acknowledged PG&E played a much larger role than other IOUs in developing the EOA. PG&E initiated and funded the EOA's creation, developed the majority of training curriculum and administrative tools, and provided more management support and involvement in development of the compliance improvement program, in general. Moreover, PG&E maintained a staff person dedicated to training and development of compliance improvement activities, while EOA staff at the other IOUs had additional Program responsibilities.

Within all IOUs, EOA activities relied heavily on the IOUs' energy education centers for classroom space, and support for many administrative tasks for measure-based trainings. PG&E's EOA training manager actually serves as a member of the education center staff, while at Sempra and SCE, EOA staff work for the C&S Program, but are completely separate from the education training center, and must hire energy education centers for their services.

For Sempra and SCE, this has meant that EOA, being completely dependent on energy centers for successful implementation of the EOA, has had limited control and input regarding resources at the energy education centers. This has made it more complicated for SCE and Sempra EOA staff to coordinate trainings held there, than for PG&E staff. Having the EOA program manager serve as a member of the energy education center staff at PG&E facilitates EOA activities to be integrated into the education center schedule, and to leverage the economies of scale the center

provides. Staff interviewed indicated PG&E's arrangement was more effective for delivery of Program trainings held at education training centers.

Based on staff comments, the EOA efforts have effectively implemented an ongoing improvement model. Debrief sheets provided by training participants have provided a valuable feedback loop for understanding what has and has not worked, and possible improvements. To date, the most common feedback received is many participants in role-based trainings believed too much information was presented for the one-day timeframe. In response, program staff plan revisions to focus curricula more on key information.

EOA staff have tracked the number of Title 24 role-based trainings and success criteria outlined in the PIP. The target of 60 trainings already has been surpassed. EOA staff have judged the program's success using several additional metrics. The knowledge swing achieved by participants in the measure-based trainings has been measured by pre- and post-training testing, and has been tracked for each type of training. In addition, the satisfaction score from debrief sheets for role-based trainings has been tracked and reviewed periodically. However, EOA staff would like to find ways to apply more results-based metrics to the trainings. One staff member suggested following up with attendees in the field a few months following training, and tracking whether they were using the checklists and applying best practices taught.

Title 24 EOA Planning and Implementation Timeframe

EOA staff indicated disparate schedules of the C&S Program, the CPUC, and CEC processes created challenges for EOA efforts. For example, EOA staff noted the shortness of the CEC codes cycle. Ideally, the EOA activities would have 18 months to implement a needs assessment and develop EOA training activities before their delivery. However, as the code cycle is only three years long, it does not allow sufficient time for all steps in the EOA development and delivery process. These challenges have been compounded by how the CPUC manages program funding. Current funding specifically addresses activities to support the current CEC codes cycle, and EOA staff will not know for some time what their budget will be for the next cycle. This has presented a challenge, as the staff currently should be preparing for the next cycle.

Funds not allocated early enough for the next cycle created other challenges. Without knowing how funds would be allocated, EOA staff could not accommodate CEC requests requiring planning for the next cycle. These challenges have affected long-term program planning for EOA staff. One staff member noted they felt uncertain regarding their position and the long-term budget, which has limited their ability to conduct longer-term planning for the EOA.

Title 20 EOA

Though the EOA program for Title 20 standards is in its early planning stages, resources and funding necessary to move forward have not been allocated. This subprogram component has been headed up by PG&E staff, who have defined the program needs, established a plan, and enlisted a consultant with extensive Title 20 experience.

Title 20 EOA planned activities differ from those conducted for Title 24, focusing more on outreach to manufacturers and distributors, ensuring they know of Title 20 standards and how to register products. As CEC is the gatekeeper of registered product lists, EOA for Title 20 will require a stronger partnership and more coordination with the CEC than for Title 24. In addition,

Title 20 EOA staff will need to work with the CEC to address database issues concerning registered products not being listed.

While these efforts could be overseen by the same EOA staff implementing the Title 24 EOA, skills and expertise required to staff this subprogram differ from those required for Title 24 EOA. Title 20 staffing will require extensive knowledge of Title 20 standards, combined with excellent outreach skills. Measures initially targeted have been based on those that could garner the most savings. These will be identified by the outside consultant.

Despite expected differences between Title 20 and Title 24 EOA activities, staff felt several best practices from Title 24 could be applied to the Title 20 activities. These included:

- Hire consultants who are experts on the industry and know the players.
- Hire consultants with technical expertise in the areas needed (e.g., instructional designers or building standards).
- Oversee consultants to ensure they coordinate work to ensure each expert's talents are being utilized to their fullest.
- Be persistent, and provide consistent ongoing communication with the team about what the Program aims to achieve.
- Have Program managers focus on gaining the support of upper management.
- Look at each measure (appliance or equipment) and each industry, and create an appropriate outreach strategy for each.
- Have a process in place to work with the CEC.
- To accommodate resources limits, focus on a few specific measures (appliances or equipment types) rather than spreading resources too thinly across too many.

Analysis of EOA Training Participant Survey Data

Cadmus reviewed and analyzed pre- and post-training test and debrief course evaluation data supplied by PG&E for six types of trainings. Methods are described in Chapter 4; analysis results are presented in this section.

Pre- and Post-Training Tests

At the start and end of each training session, participants took a 15- to 20-question exam to test their knowledge of specific subject areas. Questions were designed to measure whether participants gained knowledge during the course, and were grouped into four categories: general, envelope, lighting, and mechanical. Table 5, Table 6, and Table 7 show the average percentage change of test scores between the pre- and post-training test scores for each question category and the three different class categories.

Table 5. Training: Essentials for Energy Consultants

Training Type	Question Category	Number of Participants	Number of Questions	Possible Correct Answers	Correct Answers		Percent Improvement
					Pre	Post	
Residential	Envelope	264	7	1,848	415	672	14%
	General		3	792	304	355	6%
	Lighting		3	792	211	313	13%
	Mechanical		7	1,848	576	657	4%
Nonresidential	Envelope	286	7	2,002	476	901	21%
	General		3	858	282	380	11%
	Lighting		5	1,430	350	571	15%
	Mechanical		5	1,430	290	558	19%

Table 6. Training: Essentials for Plans Examiners and Building Inspectors

Training Type	Question Category	Number of Participants	Number of Questions	Possible Correct Answers	Correct Answers		Percent Improvement
					Pre	Post	
Residential	Envelope	591	7	4,137	1,671	2,079	10%
	General		4	2,364	1,407	1,534	5%
	Lighting		3	1,773	918	1,347	24%
	Mechanical		6	3,546	1,359	1,728	10%
Nonresidential	Envelope	367	5	1,835	563	746	10%
	General		2	734	367	382	2%
	Lighting		6	2,202	476	824	16%
	Mechanical		7	2,569	637	1,095	18%

Table 7. Training: Title 24 Modeling Essentials

Training Type	Question Category	Number of Participants	Number of Questions	Possible Correct Answers	Correct Answers		Percent Improvement
					Pre	Post	
Residential	Envelope	68	5	340	104	150	14%
	General		6	408	146	218	18%
	Mechanical		4	272	120	120	0%
Nonresidential	Envelope	79	4	316	88	123	11%
	General		3	237	45	77	14%
	Lighting		4	316	47	150	33%
	Mechanical		4	316	73	117	14%

All scores (except one) showed a positive change, indicating students gained knowledge from the training. The average improvement was 13%. For residential buildings, the least improvement tended to be in mechanical systems. For nonresidential buildings, few apparent trends emerged.

Even after training, the average amount of correct answers was typically only between one-third and one-half; the one exception was the Plans Examiner and Building Inspector residential lighting post-training results, which showed nearly 80% correct answers.

Note, however, that it is difficult to draw reliable conclusions from these results, as questions asked in the pre- and post-training tests differed. Some change between the pre- and post-scores could result from differences in the complexity of questions, though our review did not indicate a systematic bias in the complexity of the questions.

Course Evaluations

Verbatim responses received through the course evaluations indicated participants felt they had gained a great deal of practical knowledge from attending the training. Details regarding these responses are described below.

At the end of each training, participants were asked to fill out a Debrief Sheet, made up of: three open-ended questions; a series of questions relevant to that training's topics; and a series of questions common to all six trainings. Table 8 compares the percentage of participants who answered positively (agreed or strongly agreed) with those who answered negatively (disagreed or strongly disagreed) to six questions common across the trainings. More than 80% of participants responded positively to most questions, except for ratings the course's relevance to the participant's job responsibilities, and if time allotted to the session was sufficient.

Table 8. Debrief Questions, Positive % (Negative %)

Question	Course Type					
	NR EC	Res EC	NR PEBI	Res PEBI	NR Modeling	Res Modeling
	n=179	n=115	n=263	n=560	n=46	n=41
This session met my expectations.	93% (1%)	92% (2%)	87% (2%)	87% (1%)	87% (0%)	90% (0%)
The topics were relevant to my job responsibilities.	74% (3%)	78% (3%)	83% (3%)	87% (3%)	65% (7%)	80% (10%)
The presenters were clear and easy to understand.	94% (0%)	92% (0%)	89% (2%)	91% (2%)	93% (0%)	98% (2%)
The discussions were engaging and insightful.	93% (1%)	85% (2%)	88% (2%)	88% (2%)	83% (0%)	93% (0%)
The session provided practical takeaways that I can implement.	86% (2%)	83% (1%)	86% (2%)	88% (2%)	72% (2%)	95% (0%)
Given the topics covered, the time allotted to this session was sufficient.	75% (7%)	65% (14%)	72% (11%)	70% (11%)	83% (2%)	90% (5%)

Note: NR=Nonresidential, Res=Residential, EC=Energy Consultants, PEBI=Plans Examiners/Building Inspectors, Modeling=Modeling Essentials. The difference between 100% and the sum of the positive and negative percents accounts for responses in the mid-range.

Verbatim Comments

When participants were asked why they took the course, the most common reason cited was to gain a better understanding of Title 24. For Essentials for Energy Consultants (EC) and Modeling Essentials (Modeling) courses, approximately 50% of the participants said they were taking the course to gain a better understanding of Title 24 and code changes. In the Essentials

for Plans Examiners and Building Inspectors (PEBI) course, about 30% percent gave the same answer.

The second most common reason given for taking the course differed somewhat across the courses. For EC and PEBI, the second most common reason given was to increase general knowledge of the subject, with approximately 15% of participants in those two courses citing that reason. For the Modeling courses, the second most common answer was to gain specific knowledge related to the course, which was given as a reason about 35% of the time. Receiving Continuing Education credit was not rated as a significant reason for taking the courses.

Similarly, participants offered common responses in response to the question regarding what the best things about the training were, with the most common answer being the quality and knowledge of the teachers. Across the groups, 30% of the students said that instructor quality and knowledge were among the best things about the training. The next most common positive response across all participants was the course was very informative. EC and PEBI participants offered that response 15% of the time, but Modeling participants offered it only 5% of the time. Comments about the high quality of the handout materials and the ability to interact in groups were offered 11% of the time across all participants. Positive comments were also offered regarding the practicality of the course and how well organized it was.

In response to the question about the worst parts of the course, the few negative comments received addressed how little time was available to cover so much material (17%) and the quality of the facilities (5%).

11. Conclusions and Recommendations

Based upon findings from interviews and data provided by the IOUs, the Codes and Standards Program has very successfully achieved energy savings, and accounts for a large percentage of each IOU's portfolio savings. Based on our team's familiarity with energy-efficiency conferences and discussions with experts, we conclude the Program has gained national recognition for its leadership in advocating for enhanced codes and standards from utilities, regulators, advocates, and other key stakeholders. Coordination across the statewide team and with the CEC has been very efficient and effective, and the Program has been successful in its advocacy efforts, resulting in more stringent building codes and appliance standards than would exist without the Program. The Program, however, depends on the CEC's actions for achieving savings; so a core aspect of this evaluation included examining this relationship, and the various factors considered in CEC's decision-making process.

Through the evaluation team's research, we have collected useful information on the different research topics identified in Chapter 4. This chapter summarizes our conclusions and recommendations, based on the findings presented in the previous chapters. Most recommendations apply to the C&S Program teams, though some could be acted upon by other IOU entities, and some could impact outside parties.

Documentation Review

Our review covered Code Change Theory Reports, the PIP, program theories, logic models, meeting materials, and Websites. For the most part, the key Program documents reviewed were useful and fulfilled their purpose. The evaluation team identified areas in which improvements could be made regarding content, organization, and clarity. The major recommendations for written documents are presented below; recommendations to improve the Websites can be found in the *Program Processes and Operations* section.

As we reviewed some final documents for the current program cycle, our recommendations should be considered while preparing documents for the next program cycle.

To make the PIP more useful and more effective in explaining the Program:

- *Clarify differences and the uniqueness of subprograms.* Subprograms making up the overall Program need to be presented more clearly, and their linkages should be clearly articulated. Activities within each subprogram should be clearly defined.
- *Add an outline of topics in the beginning of the PIP document*. An internal outline or table of contents should be inserted to provide readers with better access to the PIP, enhancing its usefulness.
- *Fill in the missing information and unfinished sections*. The PIP should not include areas with "to-be-determined" dates and blank tables, and it should contain all identified sections. If some Program components are revised following the PIP's production, a mechanism should be established for providing an addendum with updates.
- *Implement a process to fully document interim program changes.* We recommend that the CPUC and utilities work together to develop and standardize a process to describe and

document any changes that occur after the PIP has been submitted. We believe this is an important requirement that should be implemented for every program.

To improve program theories and logic models:

- *Develop separate theories and logic models for the subprograms*. Each subprogram should have its own theory and logic model. This is essential to facilitate communication about the subprogram to individuals involved in and external to the subprogram, planning and setting subprogram goals, and informing evaluation.
- *Include more detailed information on the activities, actions, outcomes, and links within the Program.* Explain and show adoption and energy savings as outcomes of the Codes and Standards Advocacy Program.
- *Provide a narrative of the program theory that communicates why and how activities are expected to lead to outcomes*.
- *Simplify external inputs in the visual logic model into a shared high-level box to allow greater focus on the actual activities occurring inside the Program*.

To improve how savings are reported:

- *IOUs should continue efforts to establish statewide consistency in reporting Program savings.*

CEC and CPUC Cost-Effectiveness Methods

This cycle will be the first to include the C&S Program in the CPUC's risk-reward financial mechanism, which will require a determination of the Program's cost-effectiveness. Unlike other IOU programs, savings attributable to the C&S Program depend on actions of another agency, the CEC, and its assessment of cost-effectiveness. Thus, it is important to understand the CEC's cost-effectiveness test and its implications, and to progress toward applying a CPUC test that treats the C&S Program in a way most effective, equitable, and compatible with CPUC policies and objectives.

Our review of the CPUC and CEC methods found they differed and could lead to different conclusions about whether a specific code or standard was cost-effective. For Title 24, the CEC test tended to qualify more measures as cost-effective; however, the CEC focused on measure cost-effectiveness, while the CPUC addressed program and portfolio cost-effectiveness. For Title 20, it was not clear which tests were more likely to pass more stringent standards, or whether a consistent difference existed.

In reviewing the CPUC's cost-effectiveness method, as implemented in the E3 calculator, we identified several features of the calculation and underlying policies guiding the E3 methodology that did not adequately capture costs and benefits associated with codes and standards advocacy. In particular, the E3 calculator cannot include savings from buildings or products manufactured under a new code or standard in the years following the program cycle. As the new code or standard would cover these products, resulting energy savings should be attributed to the new code or standard.

In addition, given the length of time included in the analysis, and the probable commoditization of measures covered under new codes and standards, incremental costs will likely decline over time. However, E3's current analysis does not allow for declining incremental costs.

The CPUC's current policy is to primarily rely on the TRC to assess cost-effectiveness, but the C&S Program's cost-effectiveness will likely be considerably more favorable under the PAC test; so this raises questions regarding whether and how the PAC test should be applied.

Based on our review of the two cost-effectiveness methodologies and the E3 calculator, we offer the following recommendation:

- *Engage in joint studies with the CPUC and CEC to develop an appropriate cost-effectiveness methodology for the C&S Program.* The CEC, CPUC, and IOUs should research the basis for assessing Program cost-effectiveness, and the broader policy goals California's energy-efficiency efforts must achieve. An appropriate methodology should be developed to assess cost-effectiveness equitably and consistently with policy goals. As this report was being prepared, the CPUC has taken some initial steps to address this issue.

Program Processes and Operations

Overall, evaluation results show the C&S Program's processes and operations have worked very well. Communication among program staff at the different IOUs and with IOU consultants has been very effective and collaborative. The Program has established a regular schedule of conference calls and meetings to share information among Program team and with the CPUC and CEC.

A relatively small number of staff and amount of resources have been dedicated to the Program small, compared to its savings potential. While staff members report the Program effectively could use additional resources, resource constraints at the CEC may limit the number of codes and standards the Program can succeed in working with the CEC to adopt.

Both the PG&E and SCE C&S Programs increased strategic planning and coordination at the portfolio level, and with EE and ET programs. However, all staff members interviewed report more work can be done in this area. Also, both internal and external program Websites could use a more consistent structure, and better organization and document tracking.

To improve program processes and operations, we recommend the following:

- *Continue existing communication processes involving the statewide Program team and the CPUC and CEC*.
- *Continue communicating the Program's resource needs to the IOUs' upper management and the CPUC*. Identify and communicate opportunities more resources would create for heightened savings and achieving state goals, such as Zero Net Energy.
- *Develop materials to inform new staff about the Program*. Look for ways to document the Program's purpose and processes in methods useful for new staff in learning how the Program works.

- *Reexamine the allocation of resources between Title 24 and appliance standards activities (Title 20 and federal standards), accounting for Zero Net Energy goals, the CEC's larger resource allocations to Title 24, cost and impacts of federal standards advocacy, and other factors*.

To increase the Program's ability to work effectively with other IOU programs and staff, we recommend the following:

- *Continue portfolio level planning to assess the best strategy (Emerging Technology, Energy-Efficiency Program, or C&S Program) for increasing efficiency of specific measures and products at the portfolio level to both optimize savings and minimize possible conflict between the C&S Program and other programs*. Communicate the program path for individual measures, detailing how the measure will progress from other programs to the C&S Program.
- *Continue to communicate opportunities and areas of program overlap, interim findings, and progress on individual codes and standards with EE and ET program staff through regular meetings and written communications.* Keep written communication concise, and provide links to resources where staff can find more information on each topic. Revisit these communication methods to ensure they work effectively.
- *C&S Program staff should expand their efforts to help IOU upper management and efficiency program staff to better understand the C&S Program*. These efforts should address the following topics:
    - Program activities;
    - Quantification of Program energy savings;
    - Linkages to other programs;
    - Coordination and collaboration with other programs; and
    - Communicating with customers and external stakeholders about Program benefits.

The HMG and CEC Websites provide critical resources to C&S Program stakeholders, and could be made more useable and effective. To do so, we recommend the following:

- *Apply a consistent file naming convention that makes it possible for site users to identify documents more easily*.
- *Post all materials and organize them in a way that makes the Websites easier to navigate.* Make specific materials easier to retrieve through public search engines, possibly through an index page optimized for accessibility by search engines. Add more dynamic links within the HMG Website to make relevant information more accessible.
- *Provide an overview on both the HMG and CEC Websites of the codes and standards process and how stakeholders can get involved.* The roles of the different parties involved, including the IOUs and CEC, also should be clarified on these Websites.

- *Improve the internal Program Website, so progress on each code and standard can be easily seen in real time.* To facilitate collaboration, maintain a master list of topics being pursued and the existing contracts with contractors.

To make the Program's goals and metrics more realistic and meaningful, we recommend the following:

- *Revise program performance metrics (PPMs) to provide better measures of Program success.* Link PPMs to specific elements in the program theory and logic models once these documents have been revised appropriately. The metrics should recognize constraints faced by the Program in terms of the need for CEC actions on proposed codes and standards. They also should recognize and promote interactions among the C&S Program and other programs as well as the need for preparatory activities (such as developing testing protocols) that do not immediately produce savings.

C&S Decision-Making Process

The C&S Program has been involved effectively in the codes and standards decision-making process, up through adoption. The Program's efforts to coordinate with the CEC have been increasingly constructive over time, including efforts to work jointly with the CEC to determine codes and standards to pursue. Stakeholder meetings sponsored by the IOUs for Title 24 have been very well received.

Still, our research indicates the Program could implement improvements. It could work with the CEC to determine how it could become involved earlier in the process, and it could take more steps to reduce the likelihood that the Program pursues codes and standards that the CEC does not, ultimately, adopt. Some of these actions might be harder to implement for Title 20, and may require new approaches.

To make the codes and standards selection and adoption process more effective and minimize risks associated with the CEC's processes, we recommend the following:

- *C&S Program staff should continue to be involved with CEC staff in the next cycle of the rulemaking process as early as possible.* Initial meetings should focus on: the CEC and IOU wish lists; barriers to adoption and how to overcome them; and reaching early agreement on codes and standards to be pursued. This will likely require added resources due to the overlap between activities in one code or standard cycle and the next.
- *C&S Program staff should reexamine how to coordinate advocacy efforts with the CEC, and decide how to share responsibility*. This review should address factors affecting the Program's ability to adapt to changing conditions, and the process and timing involving consultant selection.
- *Program staff should reach out to CEC Commissioners to understand their interests and concerns, and to vet possible codes and standards.* As Commissioners prove to be the ultimate decision makers, it would be useful to understand their views as early and as clearly as possible.

- *Support more involvement in DOE rulemaking processes and meetings, and look for ways to become involved earlier in the process*. The Program should continue to leverage its federal efforts with organizations such as ASAP and other states, and with utilities outside California:
    - Dedicate more resources to pursuing Petitions for Waivers of Federal Preemption.
    - Facilitate increased communication between C&S Program consultants working on federal standards and national advocacy groups.

To increase effectiveness of working with industry, we recommend the following:

- *Continue conducting targeted Title 24 stakeholder meetings*. Logistics should be adjusted to improve communication of last-minute changes to materials, allow adequate lead time for the CEC to consider outcomes, and facilitate participation in Southern California. A master schedule of the process should also be provided.
- *With the CEC, explore ways the Program can become involved with Title 20 stakeholders in ways accomplishing objectives similar to those of Title 24 stakeholder meetings.* Title 24 stakeholder meetings demonstrated the benefits of becoming involved with stakeholders early. This may prove especially important in areas where no standards have previously existed, and could be an opportunity to obtain data and information that would improve the Title 20 CASE Studies.

Many timing and scheduling issues fall beyond the control of the C&S Program or the IOUs, yet they impact the Program's effectiveness and ability to claim savings credits. In particular, the CEC's adoption cycle does not match the CPUC-IOU program cycle; so IOUs' advocacy efforts typically incurring expenditures during one cycle, do not generate savings until subsequent cycles. This time lag presents a consideration in the cost-effectiveness issue, discussed earlier. The gap between when C&S Program activities and evaluation occurs also presents problems regarding obtaining accurate information for evaluating the Program. To address schedule and timeline challenges, we make the following recommendations:

- *The C&S Program should work with CPUC to ensure the cost-effectiveness and risk-reward mechanism equitably accounts for the lag between Program efforts and energy savings.*
- *With the CPUC, the Program should explore ways to make it possible to initiate evaluation activities as early as possible after codes or standards are adopted*.
- *The Program should continue monitoring DOE activities and looking for ways to influence standards adopted.* Although fewer opportunities exist for influencing national appliance standards, becoming involved in federal standards allows IOUs to stay abreast of standards proposed in various markets, and leverage the C&S Program's efforts.

Extension of Advocacy Activities

EOA efforts have exceeded the number of trainings targeted. These trainings have been well received, and differences between the pre- and post-training tests indicate knowledge has increased. However, as the pre- and post-training questions were not directly comparable,

accurate assessment of the improvement in participant knowledge was not possible. Further, without follow-up with students to determine how knowledge has been applied, it has not been possible to assess the impact these trainings have had on compliance and enforcement in the field.

To enhance the EOA's effectiveness, we recommend the following:

- *IOUs should develop an integrated approach to enhance code compliance.* The EOA training activities and the efforts associated with the CEP should be reexamined and combined into an integrated subprogram or component of the C&S Advocacy subprogram with clearly defined activities, roles, and objectives.
- *Program staff should work with the CPUC and CEC to align goals, funding, and timing to improve the EOA's effectiveness*. The CEC acknowledges the importance of effective training on new codes. Better training coordination and planning between the CEC and C&S Program for the next code cycle would help alleviate compliance and enforcement problems. Providing the EOA with funding to allow the EOA to prepare for the next code cycle would improve the quality of services delivered.
- *Document the EOA's operations and processes*. This is important to ensure consistency across current EOA implementers as well as to ensure the subprogram can continue if staff turnover occurs. The IOUs should collaborate in this process to identify areas where differences appear and where best practices can be shared.
- *Continue narrowing the material covered to what is most important; so students learn the most critical information*.

To institute an effective Title 20 EOA, we recommend the following:

- *The Title 20 EOA should adopt the Title 24 EOA best practices delineated in Chapter 10.* These will need to be tailored to Title 20.
- *Continue fostering a solid working relationship with CEC Title 20 staff*. The CEC received increased authority through SB 454 to fine manufacturers not meeting Title 20 standards. The CEC also maintains a list of complying products. It will be important for EOA staff to work closely with the CEC to implement the most effective Title 20 EOA.

To enhance the ability to measure effects of the Extension of Advocacy, we make the following recommendations:

- *Investigate ways to measure actual behavior changes attributable to EOA trainings.*
- *Collect information on training participants' characteristics, and link these to their pre- and post-training test scores.* This information would prove very valuable in determining how effective the training is with different groups, and ways to modify it to increase effectiveness with different groups.
- *Use the same questions on the pre- and post-training tests*. Because questions differed on current tests, it was not possible to determine whether changes were influenced by the questions.

- *Conduct a six-month follow-up to determine how trainees are using what they learned, and how behavior has changed.*