

## RTR Appendix

Southern California Edison, Pacific Gas and Electric, Southern California Gas, and San Diego Gas and Electric (“Joint Utilities” or “Joint IOUs”) developed Responses to Recommendations (RTR) contained in the evaluation studies of the 2013-2015 Energy Efficiency Program Cycle. This Appendix contains the Responses to Recommendations in the report:

***RTR for the California Statewide Codes and Standards Program Impact Evaluation Report Phase Two, Volume One: Appliance Standards*** (Cadmus, DNV GL; Calmac ID #CPU0169.01; ED WO #ED\_D\_CS\_1)

The RTR reports demonstrate the Joint Utilities’ plans and activities to incorporate EM&V evaluation recommendations into programs to improve performance and operations, where applicable. The Joint IOUs’ approach is consistent with the 2013-2016 Energy Division-Investor Owned Utility Energy Efficiency Evaluation, Measurement and Verification (EM&V) Plan<sup>1</sup> and CPUC Decision (D.) 07-09-043<sup>2</sup>.

Individual RTR reports consist of a spreadsheet for each evaluation study. Recommendations were copied verbatim from each evaluation’s “Recommendations” section.<sup>3</sup> In cases where reports do not contain a section for recommendations, the Joint IOUs attempted to identify recommendations contained within the evaluation. Responses to the recommendations were made on a statewide basis when possible, and when that was not appropriate (e.g., due to utility-specific recommendations), the Joint IOUs responded individually and clearly indicated the authorship of the response.

The Joint IOUs are proud of this opportunity to publicly demonstrate how programs are taking advantage of evaluation recommendations, while providing transparency to stakeholders on the “positive feedback loop” between program design, implementation, and evaluation. This feedback loop can also provide guidance to the evaluation community on the types and structure of recommendations that are most relevant and helpful to program managers. The Joint IOUs believe this feedback will help improve both programs and future evaluation reports.

---

<sup>1</sup> Page 336, “Within 60 days of public release of a final report, the program administrators will respond in writing to the final report findings and recommendations indicating what action, if any, will be taken as a result of study findings. The IOU responses will be posted on the public document website.” The Plan is available at <http://www.energydataweb.com/cpuc>.

<sup>2</sup> Attachment 7, page 4, “Within 60 days of public release, program administrators will respond in writing to the final report findings and recommendations indicating what action, if any, will be taken as a result of study findings as they relate to potential changes to the programs. Energy Division can choose to extend the 60 day limit if the administrator presents a compelling case that more time is needed and the delay will not cause any problems in the implementation schedule, and may shorten the time on a case-by-case basis if necessary to avoid delays in the schedule.”

<sup>3</sup> Recommendations may have also been made to the CPUC, the CEC, and evaluators. Responses to these recommendations will be made by Energy Division at a later time and posted separately.

**Response to Recommendations (RTR) in Impact, Process, and Market Assessment Studies**

**Study Titles:** California Statewide Codes and Standards Program Impact Evaluation Report Phase Two, Volume One: Appliance Standards  
**Program:** C&S  
**Author:** Cadmus, DNV GL  
**Calmac IDs:** CPU0169.01  
**ED WO:** ED\_D\_CS\_1  
**Links to Reports:** [http://www.calmac.org/publications/CPUC\\_CS\\_Volume\\_1\\_Report\\_FINAL\\_R1\\_05232017.pdf](http://www.calmac.org/publications/CPUC_CS_Volume_1_Report_FINAL_R1_05232017.pdf)

Item #	Page #	Findings	Best Practice / Recommendations (Verbatim from Final Report)	Recommendation Recipient	Disposition	Disposition Notes
				If incorrect, please indicate and redirect in notes.	Choose: Accepted, Rejected, or Other	Examples: Describe specific program change, give reason for rejection, or indicate that it's under further review.
1		<p>Delivery of program savings estimates, CASE reports, and CCTRs improved, but significant gaps remain in the documentation available to evaluators. Improvements include the following:</p> <ul style="list-style-type: none"> <li>Nearly all parameters (except for attribution values of federal standards) were provided at the start of the evaluation in the ISSM format.</li> <li>Market volume sources were documented, as requested.</li> <li>CASE reports and CCTRs were delivered as planned and in a shorter time period than previously.</li> <li>Although no federal attribution values were provided, attribution documentation to support federal standard adoption generally was complete and met the requirements previously identified.</li> </ul>	<p>Statewide program administrators and the CPUC should resolve data gap issues before starting the next impact evaluation.</p> <p>The IOUs should update the Code Change Theory Reports or provide other supplementary documentation that reflects the adopted standard.</p>	All IOUs and CPUC	Accepted	The IOUs will expand the scope of subsequent Code Change Theory Reports (CCTRs) to include backup documentation on updated market volumes and unit energy savings used for ex-ante savings estimates, noting, in particular, where there are differences with the CASE report values. The CCTRs will also include specific discussion of instances where the adopted standard differs from CASE report descriptions.
2		<p>Verifying compliance has become more challenging. This issue includes the following factors:</p> <ul style="list-style-type: none"> <li>Increasing complexity of regulations and data needs to assess compliance. For example, Title 20 regulations on battery charger systems used the maximum 24-hour charge and maintenance energy as the performance parameter. This information, however, this information was not readily available in the product literature; and only testing provided a way to determine compliance for products not listed on the CEC list. Similar issues occurred with regulations on swimming pool systems, which changed from pump motor requirements to specific control settings.</li> </ul>	The CPUC and evaluators should consider collaborating with the CEC to efficiently use resources for determining compliance.	CPUC, CEC, evaluators		

		<ul style="list-style-type: none"> <li>Product proliferation. For products such as televisions and battery charger systems, the CEC listing process lagged behind the rapidly changing products available on the market. Measuring compliance requires additional research for unlisted products.</li> </ul>				
3		<p>Grouping multiple product types/standards in a single CCTR tends to limit the evaluators' ability to assign attribution scores to each standard. The attribution team found insufficient information to calculate factor scores for some individual product types when supporting documentation grouped them with other products. In most instances, products were grouped in a similar manner to the rule-makings themselves. However, in federal standards there are often contributions and discussions based not on the rulemaking as a whole, but rather a specific appliance category or regulation. The extent to which equipment types and contributions to those equipment types can be separated affects the ability of the attribution team to provide a more nuanced and granular attribution score.</p>	<p>Do not group unlike technologies together in a single CCTR.</p>	All IOUs	Accepted	<p>Henceforth the IOUs will discuss technology-specific data in separate CCTRs or in clearly delineated sections of CCTRs that cover multiple technologies or standards.</p>
4		<p>Evaluating standards that target components (e.g., electric motors) proves challenging.</p> <p>Particularly for small electric motors, concern exists that products manufactured overseas may contain noncompliant parts. Verifying compliance is impossible, short of tearing out the motor. Even if testing offered an option, it would remain challenging to identify whether a product contained a covered product as components specifications are rarely available. Trade associations such as the National Electrical Manufacturers Association (NEMA) may prove useful in obtaining market data on domestic small motor manufacturers, but these statistics would likely not represent a large fraction of foreign suppliers.</p>	<p>Consider reevaluating these standards over time as more market studies are completed.</p> <p>Electric motor and small electric motor compliance also should be reevaluated after completion and application of the Certification, Compliance, Labeling, and Enforcement for Electric Motors and Small Electric Motors Final Rule.</p>	CPUC, evaluators		
5		<p>This evaluation highlighted the benefits and challenges of using whole-building savings analyses to establish potential energy savings from Title 24 and evaluate savings. We considered savings attributable to individual code requirements, as well, and identified significant differences between the estimates provided by the two approaches. A weakness in the individual code/measure approach is the lack of a method for taking into account interactions</p>	<p>Future C&amp;S Program evaluations should rely primarily on whole building analyses to evaluate Title 24 savings. To support this, we recommend that the IOUs, CPUC, and CEC collaborate to develop an approach designed to quantify statewide Title 24 savings using a consistent building simulation approach. We recommend that the program evaluation focus on verifying the inputs, assumptions, and outputs of these simulations and updating them as</p>	All IOUs, CEC, CPUC	Accepted	<p>The IOUs will propose an EM&amp;V-funded study that will discuss the costs and benefits of moving to a whole building approach for impact evaluation.</p>

		among requirements. The whole building approach using simulations implicitly accounts for interactions.	needed. We recommend that the IOUs develop a CASE report documenting the whole building analyses.			
6		The IOUs have relied on the analyses conducted for the CEC to estimate whole building code savings. However, the analyses conducted for the CEC have been documented insufficiently for program evaluation purposes and, because they serve a different purpose, they have not taken a comprehensive approach (for example, by including all building types) that would be needed to estimate Title 24 statewide impacts.	Future C&S Program evaluations should rely primarily on whole building analyses to evaluate Title 24 savings. To support this, we recommend that the IOUs, CPUC, and CEC collaborate to develop an approach designed to quantify statewide Title 24 savings using a consistent building simulation approach. We recommend that the program evaluation focus on verifying the inputs, assumptions, and outputs of these simulations and updating them as needed. We recommend that the IOUs develop a CASE report documenting the whole building analyses.	All IOUs, CEC, CPUC	Accepted	See above.
7		Although the impact estimation would be most efficient and accurate using a whole building analysis, studies of individual code requirements and measures are useful. These analyses provide insights into what measures are expected to have the largest impacts and they inform efforts to improve code compliance.	We recommend that the IOUs continue to document estimated savings and their activities supporting each of the code changes incorporated in each Title 24 update. We also recommend that the IOUs research ways to assess and account for interactions among the individual code changes to increase the consistency with the whole building estimates.	All IOUs	Accepted	Methods for assessing interactions among individual code changes will be reviewed as part of the proposed whole building assessment mentioned above.
8		The data collected and estimated on unit savings and construction/alterations during the evaluation can provide a solid basis for estimating the potential savings accurately. With sufficiently large samples and accurate market data, the evaluators could develop an independent estimate of potential savings that could replace an IOU estimate of the potential.	We recommend that the CPUC examine the feasibility and resource requirements needed to rely on the evaluation to estimate the potential Title 24 savings as an alternative to using an estimate provided by the IOUs based on CEC analyses.	CPUC		
9		For this evaluation, we estimated code energy savings in two ways: (1) comparing the as-built building to the 2008 Title 24 requirements and (2) limiting the as-built building to being no more efficient than required by the 2013 code and comparing the limited values to the 2008 Title 24 requirements. The first approach treats the baseline as the 2008 Title 24 and allows all efficiency improvements over the 2013 Title 24 to contribute to the savings. The second approach also uses the 2008 Title 24 baseline, but assumes that any efficiency improvements over the 2013 Title 24 occur for reasons other than the new code so they do not contribute to program savings. The ESAF factor takes into account the savings of buildings, whether they meet the 2013 Title 24 or not. For the current evaluation, we used a slightly different approach for the appliance standards. Unit	We recommend that the CPUC continue research on the most appropriate and consistent way to define the baseline, unit savings, and compliance, and examine opportunities to align the evaluation methods used to determine the impacts of both codes and standards.	CPUC		

		savings for appliances are based on the difference between the baseline and new standard efficiencies, but the compliance adjustment just accounts for the proportion of products that meet the new standard.				
10		Acquisition of accurate data on building construction and alterations has been a challenge for each of the C&S Program evaluations. This has been especially problematic for commercial buildings, while the CIRB data provide a fairly reliable estimate of residential new construction. Residential alterations also continue to be difficult to estimate accurately. These data are important for evaluating the Title 24 impacts, but they are critical for all projections of building energy use, such as demand forecasts.	We recommend that the CPUC consider researching diverse sources of building construction and alterations data and collaborating with the CEC in its efforts to improve data for the building sector in response to recent legislation requiring significant increases in building energy savings.	CPUC and CEC		
11		Our efforts to recruit homes to include in this evaluation were most successful when we worked with the building industry, particularly large builders.	We recommend that future evaluations focus on recruiting builders to provide access to homes for purposes of assessing construction practices. We also recommend that the CPUC consider conducting research on the housing market to determine the distribution of construction among large, medium, and small builders to use that information to fill any gaps. We also recommend that future evaluations investigate similar industry sources to provide improved access to commercial buildings for analyses of their construction characteristics.	CPUC and evaluators		
12		One challenge faced by the evaluation was identifying buildings that were constructed under the 2013 Title 24. This was especially true for nonresidential buildings, which typically take longer to construct than residential buildings. The lag between when a new code is effective and buildings are constructed under it is important for two reasons. First, it affects the number of buildings available for estimating compliance. In the case of nonresidential buildings, this is particularly problematic as the relatively long time required for construction limits the pool of buildings available to study and tends to increase the proportion of smaller commercial buildings. Second, the savings estimation depends on adjustments to the construction volume based on the length of time required to construct buildings. Based on some limited empirical data, we made assumptions in this analysis about the typical time lag between the code effective date and construction completion.	The CPUC and IOUs should consider conducting both secondary and primary research to establish improved estimates of the lag between code-effective date and construction completion for both residential and commercial buildings. Any such study should address the variation in the lag by building type and market factors, such as construction downturns.  The CPUC should examine ways to develop sufficiently accurate code compliance estimates in the near-term, but plan to true-up the estimates by allowing sufficient time to pass to collect accurate data on code compliance. This is especially true for commercial buildings, which may take longer than a year to complete. The CPUC should consider supplementing the current evaluation of non-residential new construction Title 24 impacts with additional data collection and analysis now that additional buildings have been constructed under the 2013 Title 24.	All IOUs and CPUC	Accepted	The IOUs will initiate a PAG discussion of the costs and benefits of conducting a study of the lag between code effective date and construction completion date. The results of that discussion will inform any decisions to move forward with an EM&V study, the scope of said study, and who should manage the study.
13		Compliance of residential buildings with the 2013	We recommend that the CPUC consider conducting	CPUC		

		Title 24, as measured with the ESAF, is considerably lower than it was when residential compliance was last evaluated for the 2005 Title 24. In that evaluation, the average ESAF exceeded 100%, indicating that, on average, new homes were more efficient than required by the code.	a study with builders and other industry members to understand why compliance has declined with the new code and what types of steps could be taken to improve compliance.			
14		Compliance with some specific code requirements was relatively poor. Examples include the installation of demand-control valves in homes with residential hot water recirculation pumps. Another example was common failure to meet the mandatory daylighting control requirements in commercial buildings, particularly in alterations, and incorrect calculations.	We recommend that the IOUs and CEC target compliance improvement efforts on those code requirements for which the evaluation found relatively poor compliance. The IOUs could conduct additional research to identify specific code requirements that are not being commonly met and use the findings to inform their compliance improvement activities.	All IOUs and CEC	Accepted	The IOUs will raise the issue of conducting a compliance-related EM&V-funded study in an upcoming PAG meeting to determine if a study is warranted given currently available information informing the compliance improvement sub-program efforts. If a study is considered cost beneficial the IOUs will propose a study scope through the existing EM&V study review process. In the near term, the IOUs will direct instructors to emphasize the importance of complying with these particular measures (and any other measures found to commonly fail) during the Standards Essentials courses. Additionally, the IOUs will continue to gather feedback from market actors concerning trouble spots during industry events, building department visits, classes and other work the team performs in the field.
15		We conducted two special studies as part of this evaluation to address the potential impacts of non-compliance with specific code mandatory requirements in the 2013 Title 24. One requirement was for daylighting controls in commercial building spaces and the other was application of the proper PAF in association with controls. We assessed the level of compliance with the daylighting control requirements and the impacts, and we calculated the theoretical effect of improper application of the PAF requirements. Our analyses showed that the energy impacts of both types of measures were very small, on the order of 1% of building consumption.	We recommend that the CPUC minimize the efforts dedicated to analyzing similar requirements, but include them in future evaluations to the extent that evaluation scopes permit.	CPUC		