

## 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 Final Report: 2014-16 HVAC Permit and Code Compliance Market Assessment (Work Order 6) Volumes I & 2*** (DNV GL, Calmac ID #CPU0172.01, ED WO #ED\_D\_HVAC\_6)

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.

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<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 Title:** Final Report: 2014-16 HVAC Permit and Code Compliance Market Assessment (Work Order 6) Volumes I & 2  
**Program:** HVAC6  
**Author:** DNV GL  
**Calmac ID:** CPU0172.01  
**ED WO:** ED\_D\_HVAC\_6  
**Links to Report:** [http://calmac.org/publications/HVAC\\_WO6\\_FINAL\\_REPORT\\_VolumeI\\_22Sept2017.pdf](http://calmac.org/publications/HVAC_WO6_FINAL_REPORT_VolumeI_22Sept2017.pdf)  
[http://calmac.org/publications/HVAC\\_WO6\\_DRAFT\\_REPORT\\_APPENDICES\\_VolumeII\\_22Sept2017.pdf](http://calmac.org/publications/HVAC_WO6_DRAFT_REPORT_APPENDICES_VolumeII_22Sept2017.pdf)

Item #	Sect. #	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	3 & 4	<b>Permitting rates are low</b> , with permits pulled for less than one-third of all change outs that require them. Our estimates ranged from 8% to 29%.	Evaluate current residential pilot programs that aim to increase permit rates in light of this study's findings and current regulations aimed at addressing permitting within energy efficiency programs (e.g., SB1414).	IOUs	Accepted	The IOUs don't currently have additional residential pilot programs that solely aim to increase permitting, but will explore evaluations should these pilots be developed.
2			Inform homeowners that the permitting responsibility is theirs and that they must hold contractors accountable.	IOUs and Building Departments	Accepted	The IOUs don't currently have additional residential pilot programs that solely aim to increase permitting, but will explore additional language for program marketing collateral along with increased emphasis on customer applications should these pilots be developed.
3			Have program contractors emphasize other potential benefits of permitted installations for customers, and consider literature for homeowners that does the same. Given that the Standards already dictate permits for IOU program participants, programs that incentivize system efficiency improvements (such as Home Upgrade or Quality Installation) should raise permitting rates to some degree.	IOUs	Accepted	The IOUs don't currently have additional residential pilot programs that solely aim to increase permitting, but feel HVAC programs generally can provide education and tools to contractors as needed to best inform their practices, service and sales techniques along the lines of broader benefits for permitted HVAC installations. The IOUs agree that mandatory permitting associated with SB1414 offers awareness of the importance of permitting.
4	5	<b>Under current market and enforcement conditions, permitting does not lead to increased energy-efficiency</b> of HVAC changeouts, as we found similar levels of efficiency for equipment at permitted and non-permitted sites in a representative statewide sample.	Leverage local government partnerships and non-IOU program administrators where feasible. Community Choice Aggregators (CCAs) and Regional Energy Networks (RENs) can administer energy efficiency programs under the same guidelines and funding mechanisms as the IOUs. However, these local program administrators could work directly with the building departments in their regions to improve their enforcement processes over multiple years. Because of the large number of building departments in each IOU's service territory, it may be less feasible for the IOUs to work directly with the building departments.	IOUs	Accepted	The IOUs don't currently have additional residential pilot programs that solely aim to increase permitting, but agree that leveraging local government partnerships and non-IOU program administrators where feasible may yield positive results should these pilots be developed.
5			Based on findings from the HERS interviews, we recommend the IOUs continue to support workforce education and training (WET).	IOUs	Accepted	The IOUs plan to continue HVAC WET efforts recognizing that

		Studies from the early 2000s identified a number of issues related to HVAC changeouts. The 2005 update to the Standards addressed these issues. We also know the IOUs have supported WET during the same timeframe. As an example, the Standards require temperature measurement access, and we found this at over 80% of non-permitted installations. This would indicate installer knowledge of some aspects of the Standards. We believe that in the current market these IOU and CEC trainings affect contractors that perform both permitted and non-permitted installations. Future studies on permit rates and compliance should account for any changes in WET efforts as they may affect installation quality regardless of permit status.			they support HVAC programs statewide and included in this, programs refer customers and contractors to existing WET offerings both internal and external to the IOUs. With a shift to statewide program administration for some HVAC programs, it is likely that greater effort will be put into coordinating WET efforts across IOUs and providing educational resources that directly impact the success of HVAC programs.
6		Leverage this study's performance test results to support workpaper inputs for measures addressed in the Home Upgrade and Quality Installation programs. This includes information regarding cases in which code requirements are not triggered, such as equipment-only replacements or system airflow in certain climate zones. The appendices of this report (Volume II) include summaries of data collected at sites that go beyond the analysis of compliance and energy efficiency associated with compliance. There are specific opportunities where code is not triggered based on installation scope and some limited opportunities for improvement above code where code is triggered. While we did not find statistically significant differences based on permit status, current practice (permitted or not) on average does not meet full compliance.	IOUs	Accepted	This study is/has been reviewed for program optimization and development including measure development. Additionally, it will likely be used to offer guidance for third party implementers as they design future programs.
7		Continued collaboration between the California Energy Commission (CEC) and CPUC is essential to continue improving the energy efficiency of HVAC installations in California. This could take the form of simultaneous improvement in permitting and enforcement processes, improvement in efficacy of the inspections process, or through other means.	CPUC and CEC		
8		The CEC and CPUC should consider developing energy modeling software or approaches for existing residential buildings to estimate the energy saving potential for changeouts in single family residential dwellings. The California Technical Forum may be a venue for this collaboration since it includes the IOUs and the largest publicly-owned utilities in California. The absence of a functioning model prevents stakeholders from making realistic predictions about the impacts associated with the required set of compliance measures. The absence of such a model also necessitated the creation of metrics by this study using secondary information. We recommend the model include features such as a cost calculator to factor average costs estimates for permit and compliance requirements including HERS certification.	CEC, CPUC, IOUs, and POUs	Accepted	This appears to be a recommendation for the CPUC and CEC. However, the IOUs support it as any improvements in the accuracy of savings potential will allow for more accurate modelling, delivery and reporting. Cost effectiveness is difficult to maintain when savings numbers may not reflect the conditions on the ground.
9		Reevaluate, from an energy efficiency perspective, codes that, effectively, provide no energy impacts or verification benefits. This	CEC		

			includes requiring calculations be performed for sizing, but there is no requirement to reduce size whenever possible. Consider new cost calculations that explicitly show non-energy cost savings or extended equipment life to improve the value proposition.			
10	6	There were documentation gaps for permitted installations. We found 3/4th of permitted installations had the HERS compliance forms. Among the forms submitted, only a subset contained a complete set of the required tests.	CEC and HERS Registries should take action to ensure public access to information collected by HERS Raters for the benefit of homeowners. The documentation required in the HERS process includes measurements of home performance, but these documents are not required to be provided to the homeowner or to the building department for later access. Streamlined access could be achieved by mandating building departments retain the compliance forms or by the CEC retaining the forms or by Registries responding to requests for information. Information regarding a current or prospective home's performance characteristics could be valuable to homeowners.	CEC		
11	3, 4 & 7	Permit rates are low AND Interviews with HERS Raters and homeowners confirmed our hypothesis that lack of knowledge on the part of homeowners and contractors as well as inconsistency among building departments contribute to low permitting rates and low rates of compliance with energy efficiency standards requirements.	CEC and HERS Registries should take action to ensure public access to information collected by HERS Raters for the benefit of homeowners. The documentation required in the HERS process includes measurements of home performance, but these documents are not required to be provided to the homeowner or to the building department for later access. Streamlined access could be achieved by mandating building departments retain the compliance forms or by the CEC retaining the forms or by Registries responding to requests for information. Information regarding a current or prospective home's performance characteristics could be valuable to homeowners.	CEC, HERS Providers, Building Departments		
12			CPUC and IOUs should inform stakeholders of energy efficiency requirements currently being met for permitted installations, including the results of this study and general research in HVAC performance.	CPUC & IOUs	Accepted	Access to additional data could benefit HVAC programs and the IOUs widely promote program evaluations such as this study to stakeholders. This is being done in part via WET offerings, but also as IOUs engage in various other stakeholder groups and forums.
13			Streamline and simplify statewide codes for mandatory and prescriptive HVAC requirements throughout California. Contractors and building departments may not have the resources to understand or enforce the nuances of the code or the interest in doing so. Design forms that reduce the paperwork required for code compliance.	CEC		
14	6 & 7	Training is expensive, not readily available, not effective (e.g., includes no or limited field training), and/or training material is inconsistent among training HERS Providers.	Evaluate HERS Rater training for field-testing procedures intended to assess prescriptive measures. Also, consider developing mentoring programs for new Raters.	CEC and HERS Providers		
15	6 & 7	Inconsistent knowledge among HERS Raters of the Standards leads to inconsistent/erroneous assessments in customers' homes.	Find creative ways to reiterate diagnostic testing requirements periodically.	CEC and HERS Providers		

16	6 & 7	There may be barriers to Standards compliance among HERS Raters including the expense and time associated with HERS testing.	Improve the process for submission of forms and provide technical training on new methods. Explore ways to provide information in mobile-based or web based forms so that data enters a database directly and then specific forms can be populated electronically. An additional potential benefit would be to allow homeowner access to information about their HVAC system performance.	CEC and HERS Providers		
17	6 & 7	There may be barriers to Standards compliance among contractors including the expense and time associated with HERS testing.	Improve the marketing and branding of the HERS compliance process. Improve customer awareness of permit and compliance requirements for HVAC changeouts. Presently, there are very few relatively recent articles online to promote the program.	CEC, HERS Providers with CPUC/IOU Support	Accepted	The IOUs will explore increasing levels of program marketing and awareness around permit and compliance requirements, balancing program benefits with increased delivery costs.
18	6 & 7	Contractors may find it difficult to keep up with changes to Standards, which may contribute to poor-quality installations.	We recommend the CEC and IOUs improve engagement with the California's Contractors State Licensing Board (CSLB) to establish additional requirements for C-20 contractors. Specifically, encourage them to adopt requirements for continued education training courses and leverage IOU resources such as "Energy Code Ace." In order to get all parties in the value chain on the same path, we recommend establishing requirements for building inspectors to participate in continued education training courses.	CEC, CSLB, Building Departments with CPUC/IOU Support	Accepted	The IOUs are not responsible for code enforcement. Code enforcement is within the domain of the CEC and local authorities. That said, IOU compliance improvement efforts have endeavored to clarify code understanding among parties impacted by code changes. The IOUs plan to continue code compliance training and continue support of CEC efforts to promote higher compliance. The IOUs will follow the lead of the CEC regarding CSLB efforts they may undertake and would support the adoption of CEU requirements for contractor license renewal.
19	6 & 7	Contractors may find it difficult to keep up with changes to Standards, which may contribute to poor-quality installations. And enforcement of HVAC compliance requirements by building officials is inconsistent between building departments.	The Contractors State License Board should consider requiring workforce education and training credits for C-20 contractors to verify knowledge of the Standards and changes to the Standards and HERS process (e.g. forms and use of Registry).	CEC, CSLB, with CPUC/IOU Support	Accepted	The IOUs will continue to provide training for interested parties regarding current federal and State codes and standards relating to energy efficiency. These trainings are freely available. Any requirements for training of C20 contractors would have to be made by non-IOU parties. If any specific requirements are made by the CSLB or CEC the IOUs will attempt to tailor compliance training efforts to meet said requirements, assuming that the CPUC approves sufficient IOU budget for such trainings.
20	7	Enforcement of HVAC compliance requirements by building officials is inconsistent between building departments.	The CEC could work with building departments to have HERS Raters perform all HVAC inspection points with marginally increased fees and then offload building department staff from doing HVAC replacement inspections. This would allow homeowners to only pay for a single inspection instead of one from the building department and another from a HERS rater.	(Not specified)	Other	This appears to be a recommendation for the CEC.
21	6 & 7	Enforcement of HVAC compliance requirements by building officials is inconsistent between building departments.	Create a compliance complaint line to be used by contractors, HERS Raters, and homeowners who believe building departments are not providing adequate enforcement.	CEC and Building Departments		
22	7	Enforcement of HVAC compliance requirements by building officials is inconsistent between building departments. Additional regulation will improve the HERS Rater services and lead to better-quality installations.	Consider enforcement paths other than penalty fees (e.g., HERS requirements, inspections at the time of sale).	CEC, CPUC, and Building Departments		
23	8	This study provides a snapshot for the	Study whether spillover savings may exist for the CEC's and IOUs'	CPUC		

		time period studied. Additional research in this area can provide additional insights and also provide indications of changes in market and enforcement conditions.	workforce education and training efforts. The relatively high rates of compliance and energy efficiency at non-permitted installations among non-participants in energy efficiency programs may be indirectly attributable to these efforts. This study did not pursue evidence suggesting this connection, but such a connection is plausible. It may be important to acknowledge that these trainings are being taken by contractors who are not pulling permits. This implies the education and training to improve compliance affects the broader HVAC replacement market and not just permitted installations.			
24	8	This study provides a snapshot for the time period studied. Additional research in this area can provide additional insights and also provide indications of changes in market and enforcement conditions.	Continue analyzing performance data; If data access is improved as recommended in the previous section, compliance data collected by HERS Raters can be mined and analyzed to help target insufficient installation practices. Reviewing detailed data can help to track progress toward improving compliance of HVAC replacements.	CPUC		
25	3, 4 & 7	See above.	To increase the incidence of HVAC inspections, building departments should consider requiring duct testing and performance measurement for air conditioners at the time of sale for existing homes. Homes should be required to be “to code” when sold. Such a requirement would be easier to enforce than permitting at time of replacement and would be difficult to ignore, as several other inspections are ordered at time of sale. The City of Davis has already adopted this model for existing home sales. Another option would be to provide homebuyers with a path to order a HERS rating just as they can order other inspections during sale negotiations.	CEC and Building Departments		
26	7	Enforcement of HVAC compliance requirements by building officials is inconsistent within building departments.	Building departments should eliminate inconsistent enforcement of the Standards among employees through more routine training and internal auditing.	CEC and Building Departments		
27	6	Contractors may find it difficult to keep up with changes to Standards, which may contribute to poor-quality installations.	Building departments and HERS Registries should improve coordination to eliminate open permits.	Building Departments and HERS Providers with CEC		
28	8	This study provides a snapshot for the time period studied. Additional research in this area can provide additional insights and also provide indications of changes in market and enforcement conditions.	Perform a “secret shopper” study in regions of California with high uncertainty of permitting and compliance. Consider working with Contractors State License Board and specific building departments to identify the worst cases that may avoid scrutiny. The actual volume of the extreme cases is a particular research question to answer.	CPUC		