

## 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:

<p><b><i>RTR for the Impact Evaluation of 2015 Upstream HVAC Programs (HVAC 1)</i></b> <b>(DNL GL, Calmac ID #CPU0116.03, ED WO #ED_D_HVAC_1)</b></p>
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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:** Impact Evaluation of 2015 Upstream HVAC Programs (HVAC 1)  
**Program:** HVAC  
**Author:** DNV GL  
**Calmac ID:** CPU0116.03  
**ED WO:** ED\_D\_HVAC\_1  
**Link to Report:** [http://www.calmac.org/publications/HVAC1\\_2015\\_ImpactReport\\_Final.pdf](http://www.calmac.org/publications/HVAC1_2015_ImpactReport_Final.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	39	<p>Upstream HVAC—Unitary Systems:</p> <p>This impact evaluation of the 2015 Upstream HVAC programs revealed lower than expected savings for the smallest size units (under 4.5 ton) and good realization rates for units 5.5–20 ton. The primary driver of the realization rates was that, on average, the full-load efficiencies of the installed equipment were lower than claimed estimates assumed efficiency levels in some cases. While not evaluated in 2015, we did notice the measures with lower 2013-14 realization rates also had decreased unit energy savings claims in 2015. The evaluation team believes minimum primary reason for the improvements was the code update and updated version of DEER for 2015 while 2014 had to utilize different baselines within the calendar year. For the smallest units where realization rates could improve further.</p>	<p>We recommend the IOUs and DEER team for the updates made to the latest versions of DEER based on performance data provided by the Upstream programs and PG&amp;E in particular. The 2015 claims already showed some key improvements and the expectation is that going forward the measure efficiency should not be a major source of uncertainty.</p>	PG&E, SCE, SDG&E	Accept	<p>During the applicable timeframe, DEER efficiency tiers were defined by a minimum IEER “or” minimum EER to fulfill either part load or full load requirements. It is therefore possible that equipment with high IEER but low EER values was installed in some cases. Current program requirements are for a minimum IEER “and” minimum EER.</p> <p>The IOUs have aligned incentives in the 2017 Upstream program with DEER 2017 minimum efficiency requirements and savings. Additionally, SCE is working with PG&amp;E and Energy Solutions to model each equipment size category and each tier with manufacture supplied performance curves that accurately represent each model’s EER and IEER. Jeff Hirsch has reviewed the “Workpaper Plan” (as well as SCE). Mr. Hirsch has provided initial approval to document how performance curves model control strategies. Preliminary results show increases in savings. Energy Solutions will then write a new large commercial workpaper with savings captured from modeling features (e.g. staging of compressors, multiple compressors, variable speed fans and compressors).</p>
2	39	<p>Upstream HVAC—Unitary Systems:</p> <p>The field-testing of 5.5-20 ton units showed that fan performance and part-load performance curves were similar to current DEER assumptions in most cases and only one size class had a measured average fan power index that was different than DEER. The characterization of fan performance and part-load performance data for smaller systems, under 5.5 ton, can still benefit from additional data collection, as the sample size for this evaluation was insufficient since there are now multiple size categories below 5.5 ton.</p>	<p>For workpaper developers and evaluators: Review new data collected by this study, especially for 5.5–11.5 ton units where a change was made to the workpaper fan power index assumption. Collect additional data on fan performance, W/CFM to characterize the program population.</p>	PG&E, SCE, SDG&E	Accept	<p>The upstream unitary HVAC program in question has had significant uptake of equipment in high efficiency tiers characterized by multi-speed and variable speed fans. DEER energy savings calculations, however, are solely based on 2-speed fan performance. It is possible that the small EM&amp;V study size is the reason why not more multi- and variable-speed fan equipment was discovered as part of the EM&amp;V study.</p> <p>PG&amp;E is currently collecting performance maps from manufacturers in order to better model the energy savings being achieved by multi- and variable speed unitary HVAC equipment.</p>

3	39	Upstream HVAC—Unitary Systems: The smallest unitary system, less than 4.5 tons, are not required by Title 24 to have economizers. However, many of the units incentivized by the program in this size category were found to be equipped with economizers. Although the evaluation team has not yet established any influence, it is probable that the program has influenced the economizer inclusion for a portion of units in this size category. Seeing this situation as a potential savings opportunity, we recommend the following.	For program managers and designers: Create a measure to capture economizers added to units that do not require them (less than 4.5 ton). For this study it was unknown to what degree economizer additions were influenced by the program. If the program is determined to be strong influence, there would be substantial savings to be claimed.	PG&E, SCE, SDG&E	Accept	This recommendation can be explored further in future programs and opportunities. REA of economizers does not make sense in all climate zones because with current RUL rules the TRC is not cost effective. We would need to consider the cost effectiveness of adding economizer as a measure for units under 5.4 tons. We would need to collect more information from manufacturers on measure costs and potential program influence to affect economizer sales for this size category. Although IOUs will not design the SW PA Upstream program, it is anticipated that the PA will adopt best practices.
4	40	Upstream HVAC—Unitary Systems: The evaluation team found that a considerable savings potential is not being realized because many of the economizers for unitary systems being installed through the program are not functioning properly. Our testing occurred within two years of installation, but just over one-quarter of the economizers were found to not be working. Some tests uncovered errors such as improperly wired sensors that indicate that the economizer was not installed correctly and has never functioned as designed.	For program managers and designers: Although this recommendation does not fit within the Upstream Program, the non-functioning economizers found by this evaluation represent an excellent savings opportunity. We recommend a separate initiative to assure proper economizer function through contractor training and incentives. The program would obtain video/photographic evidence or some other proof that the economizer is fully functional before dispersing an incentive payment. This would be separate from the Upstream program and proposed post-installation and not as a code compliance activity.	PG&E, SCE, SDG&E	Accept	The IOU Quality Maintenance (QM) programs currently offered help ensure economizers are properly functioning. The QM programs have already identified economizer repair as a priority. This is also addressed by economizer classes offered by the IOU training programs as well as mentoring programs offered by the implementers.
5	40	Upstream HVAC—All Programs: We found that the program did not have a major effect on distributors' behavior, leading only 35 percent of distributors to change their patterns for stocking equipment. During their interviews, several distributors mentioned a lack of clarity on incentive timing which impeded their ability to stock and sell the units. Another distributor commented that if he can count on an incentive's availability he will stock the high-efficiency equipment.	For program managers and designers: Reducing uncertainty regarding how long the incentives will remain in place at a given level would likely increase the trust which distributors have in the program, and, in turn, increase their willingness to change their stocking practices. Program practices which would increase participant certainty about how long the incentives will remain in place would include informing the distributors when the program is going to run out of money ahead of time, and honoring incentives for HVAC purchases that are already registered in the system.	PG&E, SCE, SDG&E	Accept	As a regulated entity, IOUs are required to be good stewards of the ratepayer's dollars. Incentive changes and equipment eligibility is wholly dependent on Impact Evaluation recommendations and Ex-Ante direction through DEER. If a measure is not cost effective, the program must either decrease incentives to slow uptake in the market or sunset the measure altogether. The IOUs' goal is to limit changes to the program and inform distributors of budget limitations, including implementing a reservation and incentive cap system for the different technology categories in the program with regular communication of updates. Although IOUs will not design the SW PA Upstream program, it is anticipated that the PA will adopt best practices.
6	40	Upstream HVAC—All Programs: Marketing tools for distributors could be improved: During our interviews, multiple distributors asked for additional sales tools and marketing materials to help them sell high efficiency units. We believe that distributors would make good use of CPUC- and IOU-hosted training and online savings calculators.	For program managers and designers: Provide distributor program training and online savings estimators that are focused on helping convert lost sales of high-efficiency equipment.	PG&E, SCE, SDG&E	Accept	Implementers and Administrators are developing additional marketing tools to assist distributors. Currently the IOU WE&T teams are collectively working on developing and organizing an education/training showcase event that focuses on identifying and selling the value proposition of EE for commercial HVAC. Although IOUs will not design the SW PA Upstream program, it is anticipated that the PA will adopt these best practices.
7	41	Upstream HVAC—All Programs: Many distributors sought better communications on program changes in general, in addition to their more	For program managers and designers: Communicate program changes more clearly to distributors with as much advance warning as possible. Since pass-	PG&E, SCE, SDG&E	Accept	The IOUs' goal is to limit changes to the program and inform distributors of budget limitations, including implementing a reserva-

		specific demands for better information about incentive availability. Because the sales cycle for some high efficiency units can be several months, distributors want to keep their staff and buyers informed of any changes to the incentives.	through incentives had the highest attribution score for both distributors and buyers, clear communication on program changes can help distributors make better decisions on the incentives they pass on to buyers.			tion and incentive cap system for the different technology categories in the program with regular communication of updates. IOUs recognize that current challenges include different timetables for workpaper and program implementation, which runs on a calendar year. For example, it can take over 6 months for distributors to adjust their unitary AC, VRF, and chiller projects and inventories in response to changes in measure eligibility and incentive levels. Although IOUs will not design the SW PA Upstream program, it is anticipated that the PA will adopt best practices.
8	41	Upstream HVAC—All Programs: During their interviews distributors provided suggestions on how the upstream HVAC program could be improved. Some of their suggestions, in addition to those mentioned above, included involving small municipalities in this program, offering different incentives and technologies based on climate zones, and including new technologies in the program.	For the HVAC Project Coordination Group: We recommend that the IOUs and CPUC set up a mechanism (if one does not exist) to solicit regular input from distributors on potential improvements to the program.	PG&E, SCE, SDG&E and CPUC	Accept	This mechanism does exist for all IOUs. The IOUs or their implementers meet with distributors to ascertain what is happening in the marketplace and what new technologies are available. The distributors encourage them to send new technologies to the ETCC (Emerging Technology Coordinating Council) which includes industry stakeholders. Although IOUs will not design the SW PA Upstream program, it is anticipated that the PA will adopt best practices.
9	41	Upstream HVAC—All Programs: Nearly 50% of the buyer program tracking data we received was missing distributor names and buyer contact information. As a result, we could not match several completed distributor interviews to buyers, resulting in their omission from our NTG analysis. However, we believe that the data from these unmatched distributor interviews should be used for future analysis.	For program managers and designers: The programs should strive to collect higher quality buyer tracking data, with special emphasis on collecting information relating buyers to the distributors that sold them their units. This will help increase the number of buyers matched to distributors that evaluators can use for our NTG causal pathway analysis in future studies. For example, the program application form should have the contact information for the distributor, contractor, and buyer, as well as indicate who was present at the time of purchase. For IOU EM&V staff: We further recommend that a process evaluation be conducted for this HVAC upstream program to further analyze the distributor interview responses (from both “matched” and “unmatched”) distributors. Our evaluation, by necessity, focused on distributor responses most relevant to program attribution, but other interview responses could also be useful for identifying interesting market trends and for providing insights on how to improve upstream HVAC program design.	PG&E, SCE, SDG&E	Other	The recommendation does not reflect the HVAC sales distribution channel in the market. With limited exceptions, distributors do not sell to “buyers”, they sell to contractors. Contractors are not obligated to provide distributors with information on the “buyer.” Therefore, this information can be difficult to collect on many job types. Imposing a requirement misaligned with the sales process will result in low compliance with the requirements and further depress overall program participation. Requiring “buyer” information would likely cause further decrease in participation because distributors would not be able to collect this information for certain job types, and require additional time and money to collect for other jobs, decreasing the effectiveness of the incentive. The IOUs collect and match installation site address to service account ID to ensure they are within the IOU territory.  The IOUs are assessing the opportunity of the process evaluation of the HVAC Upstream program in preparation of SW implementation. Although IOUs will not design the SW PA Upstream program, it is anticipated that the PA will adopt best practices.