

## 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 and beyond. This Appendix contains the Responses to Recommendations in the report:

***RTR for the Impact Evaluation Report: Commercial HVAC Sector—Program Year 2019 (EM&V Group A)*** (DNV GL, Calmac ID #CPU0228.01)

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 CPUC Decision (D.) 07-09-043<sup>1</sup> and the Energy Division-Investor Owned Utility Energy Efficiency Evaluation, Measurement and Verification (EM&V) Plan<sup>2</sup> for 2013 and beyond.

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> 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>2</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>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 Report: Commercial HVAC Sector—Program Year 2019 (EM&V Group A)  
**Program:** HVAC  
**Author:** DNV GL  
**Calmac ID:** CPU0228.01  
**Link to Report:** [http://calmac.org/publications/CPUC\\_Group\\_A\\_Commercial\\_HVAC\\_Impact\\_Evaluation\\_Report\\_PY2019\\_Final.pdf](http://calmac.org/publications/CPUC_Group_A_Commercial_HVAC_Impact_Evaluation_Report_PY2019_Final.pdf)

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				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.	Choose: Accepted, Rejected, or Other	Examples: Describe specific program change, give reason for rejection, or indicate that it's under further review.	Choose: Accepted, Rejected, or Other	Examples: Describe specific program change, give reason for rejection, or indicate that it's under further review.	Choose: Accepted, Rejected, or Other	Examples: Describe specific program change, give reason for rejection, or indicate that it's under further review.
1	41	<p>PA Tracking data contained incorrect contact information.</p> <p><b>Additional Supporting Information:</b>                      We came across many cases where the contacts listed in the tracking and implementation data were unknown at the telephone numbers provided. In other cases, the telephone number had been disconnected. These types of issues are in some cases unavoidable. However, there were a large number of cases where no end user contact information was available, and as a result end-user data collection was not possible. Therefore, the evaluation was unable to spend additional resources trying to reach the right contact at each site when the PA provided contact proved incorrect.</p>	<p>PAs should continue to work to ensure that the contact information in the tracking data includes the correct and complete name, phone number, and e-mail address of the end-user's primary contact. We would also ask that implementers take measures to ensure that project data includes contact information for both the equipment buyer (for evaluating purchasing decisions) and the equipment operator (for obtaining installation characteristics such as schedules, setpoints, installed quantities, and so on).</p> <p>We believe accurate contact information will improve the response rates in at least two ways:</p> <ul style="list-style-type: none"> <li>• Evaluators will be able to establish their bona fides early through introductory letters or emails, giving later attempts to reach site contacts a better chance of success than cold calls.</li> <li>• Evaluators will be more</li> </ul>	All PAs	Accepted	Data integrity is a must for a successful program implementation and for the evaluator of these programs. PA's need to do a better data management.	Accepted	SCE's Commercial Upstream Program closed March 2021. The program design focused on the sales delivery channels of manufacturers and distributors and did not collect project end-user contact nor equipment buyer and operator contact information. The program has transitioned to the Upstream HVAC Statewide program lead by SDG&E. Data collection requirements would be addressed on the statewide program design.	Rejected	SCG has one measure in this program, space heating boilers. For Midstream participants SCG has limited visibility into end use due to program design. For the Downstream program, SCG is already collecting the requested information.	Other	With the recent release of the 2023 DEER draft Resolution E-5152, the recommendations set forth from this PY2019 impact evaluation is outdated as the E-5152 has addressed this recommendation in section E – Updates Based on Review of EM&V Studies and emphasized in paragraph E.1 - Upstream and Mid-stream Program Tracking data requirements.

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			likely to reach the best respondent at each site on their first attempt.									
2	41	<p>PTAC controls realized 15% and 8% of statewide reported electric energy (kWh) and peak demand (kW) savings, respectively, in 2019.</p> <p><b>Additional Supporting Information:</b> SDG&amp;E programs realized 2% and 3% of reported electric energy and peak demand savings, respectively.</p>	<p>DNV GL recommends that PAs develop savings for PTAC controls and other similar HVAC controls technology groups with appropriate baseline, proper building types and vintage to reasonably capture the savings attributed to the technology improvements in these technology groups. For PTAC controls and other similar HVAC controls technology groups, DNV GL suggests PAs consider collecting and archiving the technology related performance data to ensure that the technologies are operating as intended. The collection of performance data will also assist appropriate evaluation of the HVAC controls technologies.</p>	PG&E, SDG&E	Other	<p>Energy savings should use the appropriate baselines and assumptions as recommended by evaluator, however, monitoring technology performance as recommended will be costly for any PA sponsored program. Perhaps doing a representative sample will be acceptable in terms of cost.</p> <p>PG&amp;E Retired this measure at the end of 2019. The PTAC controllers may be ISP already (controls are required for new construction by the building code)</p>					Accepted	<p>The program which implemented the PTAC controls during Program Year 2019 has since closed. The current SW-HVAC program does not offer PTAC controls or any similar control offerings. On a going forward basis, SDG&amp;E's third-party implementers may consider PTAC controls project as custom and subject to the CPUC CMPA review process that includes pre/post measurement verification.</p>
3	41-42	<p>Achieved GRRs are lower than 100% due in part to a reduction in installation rate from controls removal or override, as determined through our virtual audits.</p> <p><b>Additional Supporting Information:</b> The SDG&amp;E program in particular exhibited a 22% reduction in claimed kWh savings due to 5 of 13 sampled projects that had at least one instance of measure removal or override as a result of guest complaints. We determined that the PG&amp;E and SDG&amp;E programs, which are administered by third parties, did not incorporate independent QA/QC or field verification on a subset of tracked claims.</p>	<p>Administrators of programs involving similar HVAC controls measures should perform quality verification of installations to mitigate the risk of removal or bypassing of the controls. Hotel/motel guest comfort can be wide-ranging and subjective, potentially resulting in gradual controls equipment override or removal. One defensible method for quantifying the in-service rate involves field verification on a subset of tracked claims after an agreed-upon period of time. For programs that outsource administration and implementation responsibilities</p>	PG&E, SDG&E	Rejected	<p>PG&amp;E performs site visits to verify installation of these type of measures. We take a sample of statistical significance and perform a QC/QA evaluation.</p>					Other	<p>The program which implemented the HVAC controls and achieved the lower than 100% GRRs during Program Year 2019 has since closed. The current SW-HVAC program does not offer the HVAC controls measure associated with those measure deficiencies. In the future, if the SW-HVAC program was to offer these HVAC control measures, a percentage of those projects would be subject to our internal Quality Control inspection review. Additionally, the current SW-HVAC program does employ a pay-for-performance framework as suggested. SDG&amp;E's local third-party implementers do have the option of submitting custom project for this technology type which will be subject to CPUC CMPA review process.</p>

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			to third parties, we have found that withholding a share of the performance payment can be an effective motivator to perform field QA/QC and incorporate its findings in the final savings claims.									
4	42	<p>We continuously encountered gaps in tracking data for basic information that could have been collected by direct-installers throughout the PTAC controls evaluation.</p> <p><b>Additional Supporting Information:</b> Such information that would have lessened the evaluation burden included: make/model and vintage of affected PTACs and PTHPs, average square footage of affected guest rooms, and year of hotel/motel construction or renovation.</p>	Future programs offering similar nonresidential HVAC controls measures should require installers to collect, aggregate, and archive facility- and measure-level data relevant to independent savings assessment.	PG&E, SDG&E	Accepted	PG&E will evaluate this recommendation for other HVAC controls since our PTAC measure was retired on 12/31/2019.					Other	The program which implemented the PTAC controls during Program Year 2019 has since closed. The current SW-HVAC program does not offer the PTAC controls or any similar control offerings. The current SW-HVAC program has implemented data collection requirements that follow the E-5152 DEER resolution guidance pertaining to "Upstream and midstream program tracking data requirements". Furthermore, the 2023 DEER draft Resolution E-5152 addresses these recommendations in Section A – DEER Updates Cycle Revisions and E- Updates Based on Review of EM&V Studies. SDG&E to collaborate with CPUC staff, other IOUs, and the third-parties, if this technology type ever re-surfaces as a deemed measure.
5	42	<p>Despite the lower- than-expected GRRs, we found that the PTAC controls measure group exhibited relatively high net-to-gross ratios (NTGRs): 94% for both electric energy and peak demand savings.</p> <p><b>Additional Supporting Information:</b> The high NTGRs are attributable to two main factors: lack of end-user awareness of the rebated controls technology and the direct-install program design that reduced the application burden on the end-user.</p>	Future programs offering similar nonresidential HVAC controls measures should incorporate the successful direct- install design components that led to high NTGR values for the PTAC controls measure group in PY2018-19.	PG&E, SDG&E	Accepted	PG&E will apply lessons learn from this measure to other similar technologies for HVAC controls.					Other	The program that implemented the PTAC controls during Program Year 2019 has since closed. The current SW-HVAC program does not offer the PTAC controls as a measure. The PTAC measure has since moved to a Custom approach where significantly more data will be collected as part of the project and will require measurement and verification as part of the savings validation, among other building related data.
6	42-43	<p>The evaluation team identified three main deviations between PG&amp;E savings claims and workpaper guidance applicable to PY2019 projects.</p> <p><b>Additional Supporting Information:</b></p> <ul style="list-style-type: none"> <li>Title 24 code requirements – The PG&amp;E workpaper specifies that</li> </ul>	PAs should ensure that ex ante savings claims comply with the applicable workpaper(s). While the PTAC controls hotel/motel guest room measure has since been discontinued by PG&E, we have	PG&E	Accepted	Recommendations are part of our current practice; this measure was retired in part due to the issues discussed by evaluator in this section.						

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		<p>newly constructed facilities or end-of-life PTAC/PTHP installations must abide by the energy code in effect at the time of project application. In the case of PY2019 PTAC controls, the applicable code was California Title 24 2013, which requires that new PTACs or PTHPs installed in hotel or motel guest rooms to already have occupancy-sensing devices or equivalent controls built-in that set back the temperature set-point during periods of guest room vacancy. This code requirement thereby eliminates the controls savings for PTACs or PTHPs installed after the code's effective date of July 1, 2014.</p> <ul style="list-style-type: none"> <li>• Building classification – The PG&amp;E workpaper specifies that hotel/motel facility types are eligible for the PTAC controls measure. However, evaluators identified 9 projects within the sample of 74 PG&amp;E projects that occurred at senior care facilities distinctly different from hotels or motels. Evaluators nonetheless quantified the savings for such installations (using the nursing home prototype DEER model as explained in Section 4.1), as they may present a viable market opportunity for other IOU programs moving forward.</li> <li>• Installations in common areas – The PG&amp;E workpaper specifies that PTAC controls measures are eligible only for PTAC, PTHP, or Split AC systems serving hotel/motel guest rooms. We found that 10 of the 74 sampled PG&amp;E projects included at least one PTAC controls measure instance on HVAC systems serving hotel/motel common areas only. We therefore did not quantify the savings for such ineligible measure installations.</li> </ul>	<p>identified some best practices should a similar non-residential HVAC controls measure be introduced in the future. Such measures should ensure that ex ante savings claims comply with the applicable workpaper(s), specifically in three areas: 1) code requirements for controls on newly installed HVAC systems, 2) eligibility by facility type for measures targeting specific nonresidential facility types, and 3) eligibility by space type for measures available to only discrete spaces within those facility types.</p>									
7	43	<p>The PG&amp;E workpaper overestimated the unit energy savings for the PTAC controls measure by treating the total, modeled, facility-wide HVAC electric energy consumption as the</p>	<p>Workpapers for similar HVAC controls measures should treat the modeled or measured HVAC energy consumption only</p>	PG&E	Accepted	<p>The baseline for the model is from DEER2005; we think this is obsolete and does not represent current conditions. Since the specific measure discussed in the sections</p>						

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		<p>basis for savings.</p> <p><b>Additional Supporting Information:</b> Since the PTAC controls measure only impacts the HVAC consumption in guest rooms—hotel/motel common areas are unaffected— the workpaper’s inaccuracy led to the overestimation savings claims for PG&amp;E programs in 2019.</p>	for affected spaces as the basis for controls savings.			has been retired, will extend this recommendation for future HVAC similar controls						
8	43-44	<p>The ACC controls only marginally reduced the PTACs’ fan energy consumption and did not produce savings at the magnitude claimed by the SDG&amp;E workpaper.</p> <p><b>Additional Supporting Information:</b> To inform the development of evaluated savings models, we requested from the adaptive climate controls (ACC) manufacturer any information supporting the SDG&amp;E workpaper’s savings claim of 30% reduction in PTAC/PTHP energy consumption (WPSDGENRHC1051). Such supporting information could include bench tests, pilot measurement and verification, or evaluation studies of the technology in other jurisdictions. Ultimately, the manufacturer produced only a single redacted study that involved pilot M&amp;V on control boxes installed in five dwelling unit PTACs within a multifamily building. The study showed that the ACC controls only marginally reduced the PTACs’ fan energy consumption and did not produce savings at the magnitude claimed by the SDG&amp;E workpaper.</p>	<p>PAs should vet measures that include proprietary and/or innovative technologies through M&amp;V or pilot test results. When designing programs that involve proprietary and/or innovative technologies, SDG&amp;E and other California IOUs should vet such measures by requesting and reviewing third- party M&amp;V data, pilot or bench test results, or other evaluation studies that demonstrate the efficacy of the proposed technology. Marketing materials from the manufacturer do not provide the same level of credibility as data-driven analyses and reports by independent third parties.</p>	SDG&E						Accepted	<p>The program that implemented the PTAC controls during Program Year 2019 has since closed. The current SW-HVAC program does not offer the PTAC controls as a measure. As of mid-year 2020, a new statewide (deemed) measure screening review process was deployed and is facilitated by California Technical Forum staff. All IOUs and third-party implementers are encouraged to submit new measures using the requirements listed on the Cal TF website (<a href="http://www.caltf.org/submit-a-measure">http://www.caltf.org/submit-a-measure</a>). Additionally, the 2023 DEER draft Resolution E-5152 addresses this concern in section B.4.1 by requiring PAs to submit a measure package plan (MPP) for new measures.</p> <p>The recommendation to vet such measures by requesting and reviewing third- party M&amp;V data will be adopted.</p>	
9	44	<p>The ex-post savings were lower than the ex-ante estimate.</p> <p><b>5.2.2. Rooftop/split systems PDF page 44.</b></p> <p><b>Additional Supporting Information:</b> The overall GRRs are 48% for kWh, 73% for peak kW and 2% for the therm. This difference is primarily due to the overestimation of savings in the ex-ante estimate, particularly due to the fan power index (W/cfm) assumption. But significant differ-</p>	<p>The evaluation team recommends that the PAs model this measure group with appropriate baseline and proposed conditions including the HVAC system efficiencies, fan power index and applicable economizer controls. In that way, the simulation results will reasonably capture the savings attributed only to the effi-</p>	PG&E, SCE, SDG&E	Accepted	New models will be developed for future HVAC controls for any PG&E program (measure retired on 12/31/2019)	Other	<p>Measure evaluation procedures on “Rooftop &amp; split systems” and all EE (deemed) offerings are done using CPUC approved procedures and methods including the proper baselines and building energy (DEER) prototypes and TMY weather-CZ specific.</p> <p>DEER prototypes for both base case and measure case are informed by latest saturation studies and impact evaluation assuming findings are statistically significant.</p>		Other	<p>The 2023 DEER draft Resolution E-5152 addresses these recommendations in section C DEER Methodology Updates by updating C22022 weather data files, migration to EnergyPlus-based modeling, new load shapes, and the adoption of the Low –GWP Refrigerant Avoid Cost Calculator (ACC).</p> <p>Additionally, SDG&amp;E will be collaborating with CPUC staff, PA technical leads, and third-party implementers by actively participating</p>	

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		ence also materialized from the misapplication of building type, where the majority of sampled claims were assigned the weighted “Com” building type to estimate UES. The ex-ante estimate approach claimed savings equivalent to 60% of the total cooling load whereas the evaluation approach produced the savings to be approximately 10% of the total cooling load, which is in line with the efficiency improvement between the standard and high efficiency equipment.	ciency improvement between the Title-24 standard and high efficiency equipment along with other efficiency upgrades. We also recommend that appropriate building type and climate zone selections are made to assign UES whenever possible. The simulation results will more accurately capture the building and weather loads represented by the DEER-specific building type and CA climate zone weather.				For Normal Replacement measures, the base case is assumed to comply with minimum T24 efficiency requirements including EER and IEER and fan power index. Some limitation on equipment full and part-load performance are inherent with DEER prototype with limited performance data and excluding in some case part load conditions and should be improved with future CPUC supported prototype updates.  The use of COM building type, given program incentive design midstream and upstream is allowed and impact evaluation methods shall be adjusted to measure implementation conditions without penalizing PA measure implementation savings.				in TAG building prototype stakeholder initiative. The prototype TAG goals are: <ul style="list-style-type: none"> <li>• Develop a single set of prototypes for use by all California state agencies and for other public research/policy purposes.</li> <li>• Develop a set of modeling assumptions that are logic driven and transparent, and have expert stakeholder buy-in.</li> <li>• Develop a set of prototypes that seeks to reasonably model the vast majority of the California statewide building stock.</li> <li>• Develop documentation for the new prototypes, including a summary of the stock assessment, and a detailed summary of inputs and characteristics of the prototypes.</li> <li>• Develop nonresidential, residential, and multifamily prototypes in time for adoption in DEER2025 (the CPUC Potential and Goals Proposed Decision may impact this timing) and the Title 24 2028 code cycle, if not earlier.</li> <li>• Establish an ongoing process for unified prototype maintenance and enhancement.</li> </ul>	
10	44-45	The midstream, distributor-facing design of the rooftop unit/split system measure group results in inconsistent or incomplete tracking data for all PAs.  <b>The workpapers list:</b> WPSDGENRHC0023-2, WPSDGENRHC0025-0 <b>What current PY2021 WP Base ID’s??</b>  <b>Additional Supporting Information:</b> Rooftop or split systems measure rebates are paid to distributors, who in turn work with contractors to install high-efficiency systems among commercial customers. While the PY2019 evaluation did not contact customers	For any measures delivered midstream through distributor rebates, such as the rooftop and split system measure group, <b>PAs must require participating distributors and partnering contractors to collaboratively collect and submit basic information for each customer that ultimately receives the rebated equipment.</b> Such information should include: <ul style="list-style-type: none"> <li>• facility name;</li> <li>• facility classification;</li> <li>• facility address;</li> </ul>	PG&E, SCE, SDG&E	Accepted	Future programs should address the gap in customer data	Accepted	SCE’s Commercial Upstream Program closed March 2021. The program has transitioned to the Upstream HVAC Statewide model lead by SDG&E. We seek guidance from the statewide program design to address data gaps.			Other	With the recent release of the 2023 DEER draft Resolution E-5152, the recommendations set forth from this PY2019 impact evaluation is outdated as the E-5152 has addressed this recommendation in section E – Updates Based on Review of EM&V Studies and emphasized in paragraph E.1 - Upstream and Mid-stream Program Tracking data requirements. SDG&E has also provided comments to the latest draft Research Plan for Group A related to data collection and will continue to engage with CPUC and CPUC consultants for additional/alternative

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		for this measure group, we did identify many cases in the sampled tracking data where the customer contact information was the HVAC distributor or contractor. For approximately 74% of projects in the PY2018 population, the evaluation team did not have sufficient customer contact data to verify equipment installation or quantify evaluated savings. For the 26% of projects with sufficient customer contact data, recruitment for evaluation was challenging, as the customers were often unaware that they had participated in an efficiency program. The measure's midstream design and subsequent data gaps caused the evaluators to fall short of the target evaluation sample count of 85 projects. Data gaps were most prominent for programs administered by PG&E and SCE.	<ul style="list-style-type: none"> <li>facility account number(s);</li> <li>name(s),</li> <li>phone number(s), and</li> <li>email address(es)</li> </ul> of customer representative(s) familiar with the project; <ul style="list-style-type: none"> <li>distributor name, phone number, and email address; and</li> <li>contractor name, phone number, and email address.</li> </ul> Information for customer representatives should include equipment operators (e.g., facility maintenance) for gross data collection as well as project decision-makers (e.g., CFO) for net data collection. <p>This basic information is critical for the utilities, the CPUC, and its contractors to verify installations and maintain the integrity of ratepayer incentive dollars.</p>									methods for forward-looking studies.
11	45	The rooftop/split system measure group consisted of more than 100 unique measure descriptions for PY2019. <b>Additional Supporting Information:</b> For many of these, the PAs are claiming the same (DEER) measure but the measure descriptions are not consistent across the PAs. This makes the task of grouping the same measures across the PAs more difficult and introduces unnecessary complication and uncertainty.	The evaluation team recommends that PAs adopt a uniform technology description naming convention for technology groups to homogenize and therefore consolidate the descriptions under each technology group in order to move towards a statewide focused portfolio and to improve the evaluability of these technology groups across the PAs.	PG&E, SCE, SDG&E	Other	The new statewide program was created to solve this type of issues.	Accepted	SCE's Commercial Upstream Program closed March 2021. The program has transitioned to the Upstream HVAC Statewide model lead by SDG&E. Uniformity in reporting measure group would be addressed through the statewide portfolio.			Other	The 2023 DEER draft Resolution E-5152 addresses these recommendations in section A – Transition to Electronic Technical Reference Manual (eTRM). The CPUC designates eTRM as the Data Source of Record, will create statewide workpapers with standardized terminology; refer to Appendix A, Table A-3.