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 Impact Evaluation of 2013-14 HVAC3 Commercial Quality Maintenance Programs (DNV GL, Calmac ID #CPU0117.01, ED WO #ED_D_HVAC_3)

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[1] and CPUC Decision (D.) 07-09-043[2].

Individual RTR reports consist of a spreadsheet for each evaluation study. Recommendations were copied verbatim from each evaluation's "Recommendations" section.[3] 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.

1 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.

2 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."

3 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.

Impact Evaluation

Study Title: **Impact Evaluation of 2013-14 HVAC3 Commercial Quality Maintenance Programs**
Program: **Commercial HVAC Quality Maintenance**
Author: **DNV GL**
Calmac ID: **CPU0117.01**
ED WO: **ED_D_HVAC_3**
Link to Report: **http://calmac.org/publications/HVAC3ImpactReport_0401.pdf**

Item #	Page #	Findings	Best Practice / Recommendations	Recommendation Recipient	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
1	CC-2	Evaporator Coil Cleaning: The laboratory test results showed very small impact from evaporator coil cleaning, primarily due to very small changes due to cleaning.	Recommend minimum fault level threshold for cleaning evaporator coils.	All IOUs	Accepted	While the lab test methodology lacked more realistic impacts to heat transfer degradation that might result in larger impacts, recommendations for a minimum fault threshold is reasonable. Development of a minimum fault threshold would ideally be measurable and quantifiable rather than based on only visual observation. It is not clear how a minimum fault threshold would provide more accurate energy impacts when workpaper energy savings using the Energy Division Dispositoin reduction (PG&E AirCare Plus and SCE CQM) saw kWh realization rates of 109%.
2	CC-2	Condenser Coil Cleaning: Applying the revised simulation savings across all measure variations resulted in average gross realization rates of 69% for electric energy (kWh) savings and 122% for electric demand reduction (kW).	Adjust the deemed savings using the new laboratory data in place of previous data.	All IOUs	Accepted	This is reasonable, but note that the IOU's differed in initial claimed savings. These adjustments should apply to the baseline savings that each IOU claimed based on workpapers. The HVAC-3 study found that the CQM disposition had understated savings by roughly six-fold.
3	CC-3	Coil Cleaning: Baseline for condenser coil cleaning can only be characterized by measuring before the cleaning is performed.	We recommend encouraging the implementer to collect discharge pressure and outdoor temperature before and after they clean the coil. They would also need to record the refrigerant charge offset. This would build the sample for detailed savings estimates while also allowing for quantification of unit baseline and savings across many more situations than can be addressed within the evaluation budget.	All IOUs	Accepted	This would require additional time and testing on the part of contractors, and may require an increase to the incentive. Recommendation from the HVAC3 report includes this statement: "This could be conducted on a sample basis as well after initial ride-along visits with evaluation technicians". Requiring the additional data on a subsample of sites as recommended would align better with cost-effectiveness goals.
4	CC-3	Coil Cleaning: Precision for coil cleaning measures was lower than anticipated. Additionally some of the sites visited did not represent the true baseline state as they had already participated in the program.	Collect more true-baseline data for coil cleaning measures by visiting sites that are entering the program for the first time. Collect additional coil cleaning laboratory data for systems under mixed faults.	All IOUs	Other	This work is currently being conducted by CPUC evaluatiors. This appears to be a directive for EM&V evauators.
5	CC-4	Refrigerant Charge Adjustment (RCA): Original implementer data supplied to the evaluation team was incomplete.	Program tracking data should be revised to inclide sticker ID using one of the current data fields based on this finding. Going forward additional care should be taken to make sure that implementer-collected data agrees with the tracking claims. An additional "no-savings" measure may be warranted to capture "test only" activity or actions were currently savings are not claimed.	All IOUs	Accept	All IOUs collect the same preliminary RCA existing ("test-in") data regardless of whether additional work will be performed. Future program data provided for impact evaluations will ensure sticker IDs are provided and data is prepared aligning to evaluator expectations.

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6	CC-4	Refrigerant Charge Adjustment (RCA): The ex post estimates of an overall 1.011 adjustment to the electric input ratio (EIR) and 0.869 adjustment to unit capacity were lower than the ex ante assumptions of a 1.253 adjustment to EIR and a 0.832 adjustment to capacity for typically installed charge adjustments (those where charge was adjusted <20%).	Update ex ante estimates	All IOUs	Other	This recommendation appears to be a directive for the DEER team Given the very small sample sizes and general lack of precision, it may be better to wait on an adjustment to the DEER RCA ex-ante estimates until additional research is completed. It should also be noted that the realization rates varied dramatically across IOU's and technical methodologies employed by each program. The ex-post adjustment rates also appear to have varied between the Public Comment version and final version of the report.
7	CC-5	Refrigerant Charge Adjustment (RCA): Using eQuest to simulate savings across population climate zones and building types leads to statewide gross realization rates of 34% for electric energy (kWh) savings and 23% for electric demand reduction (kW).	Update ex ante estimates	All IOUs	Rejected	The Public Comment version of the report reported 39% gross realization rates for electric energy and 113% for demand reduction, and the program variance was much larger with a range of 3% to 64% gross realization rates across programs. These findings, coupled with sampling issues identified in the report raise serious concerns about the validity and replicability of the final estimates of 34% kWh and 23% kW.
8	CC-5	Refrigerant Charge Adjustment (RCA): A critical piece of information was the amount of charge added or removed from the units by the program for sampled units with savings claims. Each IOU stored this critical piece of information in a variety of ways and it required multiple data requests to obtain this information.	We recommend developing a standardized approach for tracking the amount of refrigerant charge added or removed from the HVAC units when the program claims the RCA measure.	All IOUs	Accepted	
9	CC-5	Refrigerant Charge Adjustment (RCA): We assumed the coefficient of variation was 1.0 in selecting our sample size when it was actually much higher given the variables that drive savings (metering device and number of compressors). The larger than anticipated variability means we need a larger sample.	Collect more RCA data.	All IOUs	Other	This appears to be a directive for future EM&V.
10	CC-6	Economizer Repair: We developed installation rates based upon the results of field inspections of a random sample of 123 units at 45 sites. During the inspections, functional testing of the economizers was performed to determine if the economizers were operating properly. A site-level installation rate was then calculated as the number of properly functioning economizers divided by the number of economizers tested. Program-level results were combined across all IOUs to create a statewide installation rate of 56%.	Update ex ante estimates to reflect ex post installation rate	All IOUs	Other	The statewide rate does not apply to all programs and is inconsistent with other areas of the HVAC-3 report where a "pass-through" was granted where data was not evaluated. Where there is no evidence to the contrary and claimed savings are low, the reported savings should be passed through.

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11	CC-7	Economizer Repair: We found many economizers "repaired" through the programs that did not operate.	Requiring the implementers to submit a photograph of the economizer open and closed for each claimed economizer would necessitate the implementer putting the economizer through its paces after installing the measure and increase the number of economizers left in working order. Additionally, requiring the implementer to record the changeover set point data would allow future evaluators to validate the assumptions in the models used to develop ex ante savings.	All IOUs	Rejected	SCE CQM already collects alternate documentation in the form of written technician verification which highlights economizer component condition before and after any repairs are performed. Photos alone would not provide such clear verification nor would they augment verification due to realistic issues with complex rooftop lighting conditions and unit identification (do the dampers shown belong to the unit?). The program currently collects both the existing ("test-in") and modified ("test-out") economizer changeover set point. The program additionally collects information around each and every component in the economizer section, asking the technician to specifically address each component's status and to enter recommendations for repair, replacement, cleaning, or adjustment of each of these components.
12	CC-7	Economizer Repair: We found many economizers "repaired" through the programs that did not operate.	Coordinate efforts between implementation and evaluation to collect additional data on why economizers are not functioning. Collecting more information to characterize failure modes should lead to more focused repairs in the future. Collecting economizer airflow data to further quantify outside airflow rates is also needed	All IOUs	Accepted	Programs already collects alternate documentation in the form of written technician verification which highlights economizer component condition before and after any repairs are performed. The program additionally collects information around each and every component in the economizer section, asking the technician to specifically address each component's status and to enter recommendations for repair, replacement, cleaning, or adjustment of each of these components.
13	CC-8	Thermostat Adjustment: DNV GL developed installation rates based upon the results of field inspections of a random sample of 56 units at 11 sites. We reviewed tracking data and installation record data from implementers and assessed, via the on-site inspections, the fraction of tracked units that met program- qualifying conditions. Of the 11 sites we visited, six sites had zero thermostats meeting qualifying conditions, bringing down the installation rate considerably. The overall statewide installation rate was calculated to be 30.1% based on a pass/fail assessment of compliance with program qualifications. Due to low precision ex post estimates were not updated.	Collect more thermostat data	All IOUs	Accepted	The program already collects the existing ("test-in") and modified ("test-out") thermostat set point. Thermostat set points for both the existing thermostat and replaced thermostat are required data collection fields.
14	CC-9	Thermostat Adjustment: Poor pre and post set point data.	We recommend encouraging implementers to do a better job recording the thermostat set point temperatures before and after adjustment since this would allow future implementers to modify the ex ante savings assumptions if they are inaccurate.	All IOUs	Accepted	The program already collects the existing ("test-in") and modified ("test-out") thermostat set point. Thermostat set points for both the existing thermostat and replaced thermostat are required data collection fields.
15	CC-9	Thermostat Adjustment & Supply Fan Controls: We assumed the coefficient of variation was 1.0 in selecting the sample but it was actually 1.5.	Coordinate efforts between implementation and evaluation to collect more thermostat and supply fan control data. We need a larger sample to attain better precision on the ex post savings estimates and we would like some data to compare pre-maintenance conditions in the field to implementer data.	All IOUs	Accepted	The program already collects existing ("test-in") and modified ("test-out") thermostat set point and supply fan control fan state data. Recommend that for future evaluations, evaluators start with a more conservative coefficient of variation as a contingency against potential issues.

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16	CC-10	Supply Fan Controls: DNV GL focused efforts on determining whether the baseline and installed measure conditions utilized in the workpapers were met at locations where tracking claims were made for the supply fan controls measure. The evaluation did not collect sufficient data to evaluate the three programs where savings where claimed (PG&E's Air Care Plus and SCE's Quality Maintenance programs). For PG&E's commercial QM program, only 20% of the implementer claims were eligible for the program; the majority of the fans were described with the controls set at auto or intermittent states, rather than always off during unoccupied periods. Ex post estimates were not updated.	Collect more supply fan data	All IOUs	Accepted	The program is already collecting existing ("test-in") and modified ("test-out") supply fan control fan state.
17	CC-10	Supply Fan Controls: Insufficient baseline data	Recommend investigating baseline fan state by either requiring more implementer data and/or performing a baseline study.	All IOUs	Other	For Evaluator.
18	CC-11	QM: The overall realization rate for the QM package was 132% primarily due to high realization rates for coil cleaning and economizer repair as well as a higher than expected frequency of repair for coil cleaning, economizer repair and thermostat reprogramming.	Update ex ante estimates	All IOUs	Other	This appears to apply to the SCE QM program, where the realization rates were based on the frequency of installations as contrast to the workpaper assumptions. SCE CQM program has aligned with the other IOU programs by claiming energy savings by the treatment performed. This has inherantly modified the ex ante savings estimates.