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 PG&E Advanced Lighting Controls System Tool Trial Evaluation (EMI Consulting, Calmac ID #PGE0438.01, ED WO #2141)

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[1] and the Energy Division-Investor Owned Utility Energy Efficiency Evaluation, Measurement and Verification (EM&V) Plan[2] 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.[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.

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1 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."

2 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.

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.

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

Study Title: PG&E Advanced Lighting Controls System Tool Trial Evaluation
Program: Advanced Lighting Controls
Author: EMI Consulting
Calmac ID: PGE0438.01
ED WO: 2141
Link to Report: http://calmac.org/publications/PGE_ALCS_Final_Report.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.
1	ES-11, 92	**The high cost for ALCS is the primary barrier for increased adoption.** Both participants and near-participants cited the high cost of ALCS as the main barrier for doing more spaces within their facility or for participating in the Trial, respectively. Both facility managers and contractors interviewed reported that customers require a ROI of three years or less to implement a project.	**Consider offering a rebate specifically for the installation of ALCS that is large enough to help meet customers' ROI requirements.** Based on the feedback from facility managers, it appears that the current incentive structure for lighting projects may not be meeting the market's needs. For example, one facility manager reported the deemed incentive allowed the manufacturing portion of their project to proceed quickly, whereas the complicated nature of the office lighting incentive prevented that part of the project from proceeding, because the facility manager was unsure of the final incentive amount. Another respondent said receiving a rebate for their infrastructure upgrades would have brought the ROI for the total ALCS project closer to their ROI requirements. In return for a larger incentive, PG&E should consider making access to system data a participation requirement. Having access to such data has the potential to reduce M&V costs (see Recommendation 3B) and increase savings (see Recommendation 3E). Customers' security concerns related to allowing 3rd parties access to their systems could be overcome by downloading data and conducting analysis separately as opposed to viewing real-time data in the ALCS interface. Of course, *this recommendation would have to be taken in context with ongoing changes to the lighting market and California regulatory policy and proceedings.*	PG&E	Other	While PG&E acknowledges that a rebate for the installation of ALCS to meet customers' ROI requirements may increase adoption of this technology, this has not shown to be cost effective based upon the TRC calculation and current ex-ante parameters. Deemed rebates typically require pre-determined savings calculations and given the variability in savings for sites that use ALCS, it may also not be a good candidate for deemed rebates. Additionally, with the transition to Statewide administration of the Lighting Program to SCE and the responsibility of proposing and designing new offerings transitioning largely to third-parties, PG&E is not prioritizing new measure development for lighting at this time.
2	ES-11, ES-12, ES-13, 92, 93, 94	**Market actors may be wary of installing ALCS because of previous poor experiences with lighting controls and the fact that ALCS' are still a new and unknown technology.** We heard from multiple interviewees that there is institutional anxiety around installing ALCS. This	**Publish successful ALCS case studies targeted to various audiences.** Trial participants' concerns about lighting control technology were resolved after ALCS installation. They reported high satisfaction with the quality of light, the control strategies, and had not received any complaints from occupants. As ALCS adoption grows, publishing case studies or success stories from customer implementation may help overcome some of the negative perception of lighting control technologies in the market. Providing specific messaging for the different market actors would also be helpful; the information a financial decisionmaker needs in a case study is different than the information maintenance staff needs.	PG&E	Other	While PG&E acknowledges that ALCS case studies targeted to various audiences may alleviate participant concerns about lighting control technologies, given the limited cost-effective potential for ALCS and lighting in the EE Portfolio, PG&E is not prioritizing marketing budget on lighting-related measures.

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		is due to previous poor experiences with occupancy sensors not working properly, hearing stories of early ALCS installations not working (as experienced with Site 0 in this Trial), and also due to maintenance teams' reservations about switching to systems that are unfamiliar and more complicated than their current system. IT departments also have privacy concerns about ALCS connecting to their internal internet. While many types of ALCS provide similar features and functionality (e.g., daylight dimming, task tuning, remote access), the methods by which they are implemented (e.g., how fixtures are paired to hubs, whether the fixture is integrated or not) can vary significantly. These variations can cause differences in cost, ease of installation, and user experience. As ALCS is still an emerging technology, market actors may have a hard time distinguishing between the products.	**Investigate hosting ALCS trainings for facility managers at IOU energy centers.** The trainings could include presentations on the differences between the products, occupant and facility manager experiences and satisfaction, examples of control operation, and information on programs and available incentives.	PG&E	Accepted	Through the Pacific Energy Center, PG&E typically offers more than twelve classes per year focused on ALCS which are marketed to facility managers as well as lighting designers, architects, electricians, contractors and engineers. These trainings include several hands-on trainings to increase awareness of the features and functionality of ALCS as the well as the methods to implementing these systems. Some events include multiple manufacturer's and their unique products to help specifiers and installers distinguish between products. Trainings also include events that focus on presenting case studies for successful ALCS installations including panel discussions with contractors, manufacturers, specifiers and facilities managers. Trainings currently include curriculum developed with the California Advanced Lighting Controls Training Program (CALCTP) and DesignLights Consortium (DLC). When available, these events also discuss available incentives (as noted, there are no ALCS-specific incentives at this time). PG&E intends to continue to offer ALCS trainings through the Energy Centers to increase awareness and remove barriers to adoption.
			Consider conducting bench testing or demonstration projects of different ALCS manufacturers' products. All of the participating facility managers discussed how having results from bench testing various ALCS products, or having a demonstration project, would help increase ALCS adoption. ALCS technologies are complicated, and facility managers found it hard to understand exactly what their lighting would be like after the retrofit, and they reported their ability to see it would have helped their decision-making process. In fact, having a demonstration project is the precise reason why one facility manager, the lighting contractor, installed it in their offices.	PG&E, Future Implementers and/or Evaluators	Other	PG&E will pass this recommendation on to SCE as they are the Statewide Emerging Technologies lead for electric and would be best positioned to pursue any future "bench testing" or "demonstration" projects.
			Future pilots or programs could explore the maturity and market-readiness of ALCS technologies. All of the participating facility managers discussed having installation difficulties. For example, one, Site 0, experienced severe enough wide-scale system glitches they chose to uninstall the system. While these experiences may indicate ALCS technology may not be fully matured, this is an extremely small sample size and assessing maturity was not a part of this evaluations' scope. Alongside bench testing or demonstration projects (Recommendation 3B), future research could investigate the technology's maturity and how utilities could partner with manufacturers to further address customers' concerns and barriers.	PG&E, Future Implementers and/or Evaluators	Other	PG&E will pass this recommendation on to SCE as they are the Statewide Emerging Technologies lead for electric and the Statewide Lead for the Lighting Program and would be best positioned to consider the value of future investment in ALCS pilots.
3	ES-13, ES-14, ES-15, 94, 95, 96	**If future ALCS pilots are conducted by PG&E, changes to the Trial and evaluation design could improve results.** As with any research, the Trial and this	**Conduct interviews as project phases are completed.** The interviews were originally designed to have the least impact on participants, meaning one interview was conducted to collect all the needed data. However, the sales cycle and implementation timelines are so long for ALCS that it resulted in interviewees not recalling their experience or staff turnover. As such, data collection should occur immediately after each task is finished. For exam-	Future Evaluators		

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		evaluation faced some challenges. If another pilot is undertaken, below are suggestions for improving the design.	ple, interviews about the sales cycle and completing the Tool should be conducted during the pre-retrofit metering period instead of at project completion. This would also mean staggering the incentives at each interview stage.			
			Implement a different monitoring approach. The monitoring approach to verify the output of the Tool, monitoring each control factor in 30 second to five minute intervals in up to ten spaces for Trial sites, used in this evaluation was more complicated and time intensive than the project justified. Due to the combined costs of this approach, limitations on the ability to collect data, and a limited timeframe, only a subsection of spaces in these facilities could be studied. Future efforts would benefit from taking advantage of the monitoring features already built into the lighting control systems (including those listed by the DesignLights Consortium, DLC) which have the ability to monitor the on-going operation of the lighting system, reporting what the system is doing at any given time for any given zone (e.g. dimming signal, daylighting signal, occupancy status, etc.). Using the ALCS-generated reports to determine the system behavior would provide higher quality data (no battery failures or occupant interference), reduce assumptions (aligning data with expectations and observations) and lower cost (fewer site visits; potentially no site visits if VPN access is available) compared to the approach taken for this evaluation. One potential barrier to this recommended approach is a lack of trust in the ALCS-generated data. However, it would be feasible to perform a small demonstration project (e.g. a bench-top wiring and programming exercise with short term power monitoring) or a functional test of the system in the field to verify the successful installation and configuration in the field. A small randomly selected field test to verify the system self-reporting is accurate could help utilities and public utilities commissions trust the data, which in turn would build trust in the eventual results when a much larger program relies on ALCS reported data. Fundamentally, the real-time data collected by ALCS could be utilized in Normalized Metered Energy Consumption (NMEC) calculations. Note, this calibration/trust exercise could be avoided if there were an industry-standard test procedure and certification (like the DLC Networked Lighting Controls Program). If the in-depth field monitoring is desired, we recommend utilizing different meters than those that were utilized in this evaluation that would overcome some of the data collection errors experienced by this Trial. These include using meters where remote-download is possible and/or more data can be stored onboard and where there is a warning about failed batteries.	Future Evaluators		
			Create a financial connection for PG&E contractors between site recruitment and site measurement and verification. For future pilots, the two scopes of work should be closely tied so that the measurement and verification contractor can have access to the hardware on site, a design review, and a single site visit to gather the needed data themselves. Doing so would	PG&E	Other	While PG&E acknowledges that a financial incentive for contractors to connect the activities of site recruitment and site measurement and verification may alleviate some of the observed challenges from the Trial (remote access, security concerns, etc.) and adoption of this technology, Statewide administration of the

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			have avoided the needed remote access, which may continue to create security concerns (participants reported they were concerned about the security of allowing external parties access to their control systems) for participants in future projects.			Lighting Program is transitioning to SCE as is the responsibility of proposing and designing new offerings to third-parties, PG&E does not intend to pursue development of financial incentives for ALCS at this time.
			Incorporate training for customers on ALCS controls programming into the pilot. The on-site monitoring found efficacy improvements had a much larger impact on energy savings than changes in controls. One possible explanation, based on field observations, was that control programming is often done improperly and that users may not receive adequate training to make use of the advanced control features. While the Trial included training for contractors, the next iteration of an ALCS pilot should also include training for participating customers after installation and commissioning is complete.	PG&E, Future Implementers	Other	PG&E will pass this recommendation on to SCE as they are the Statewide Emerging Technologies lead for electric and the Statewide Lead for the Lighting Program and would be best positioned to consider the value of future investment in ALCS pilots.
			Consider using ALCS data for opportunity identification. As ALCS adoption increases, there may be an opportunity to analyze the data from across many installations to identify potential lighting controls measures. For example, buildings or areas with high daylight levels and high daytime lighting consumption could be flagged as a potential candidate for daylight harvesting recommissioning. While doing so has the potential to increase projects' savings over what they might achieve without this type of opportunity identification, this type of analysis has been difficult in the past because there is so much variation in each building and area within a building. For example, one of the conference rooms for a participant site in this study is used as a connecting corridor between segments of office areas. When considered as a part of a larger data set, this conference room would show a higher occupancy rate and longer run hours than a typical conference room but result in a nonactionable finding. Repeated unactionable flags may result in lower engagement or burnout of operators, so opportunity identification must take into consideration building nuances and whether operators can take action on the recommendations. The concept of using ALCS data for opportunity identification could also be included in well-established programs such as retrocommissioning and strategic energy management. However, the success of this concept is dependent on gaining access to the ALCS data, which was a barrier experienced in the Trial and discussed in the evaluation report. Recommendation 1 (providing a large incentive for ALCS installation) offers a potential method for overcoming this barrier but would need to be tested with customers to determine its potential effectiveness.	PG&E, Future Implementers	Accepted	PG&E will consider the possibility of using ALCS data for opportunity identification, while also considering the feasibility of access to such data given that PG&E will not be prioritizing incentive development for ALCS installations at this time due to the low cost effectiveness of the intervention.