

## 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 NRNC Whole Building Impact Evaluation Report PY-2013*** (DNV GL, Calmac ID #CPU0108.01, ED WO #ED\_I\_IALC\_4)

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:** NRNC Whole Building Impact Evaluation Report PY-2013  
**Program:** NRNC Whole Building  
**Author:** DNV GL  
**Calmac ID:** CPU0108.01  
**ED WO:** ED\_I\_IALC\_4  
**Link to Report:** [http://calmac.org/publications/2013\\_NRNC\\_Eval\\_Final\\_Report.pdf](http://calmac.org/publications/2013_NRNC_Eval_Final_Report.pdf)

Item #	Page #	Findings	Best Practice / Recommendations (Verbatim from Final Report)	Recommendation Recipient	Disposition	Disposition Notes	CPUC Comments
				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	78	The primary issue regarding the Operating Conditions discrepancy involved ex ante models that are not properly trued-up to match physical as-built conditions. Some of the ex ante energy models were not trued up (i.e., "physical calibration") to reflect actual as-built equipment specifications, sequencing, and controls. The evaluation team believes there is room for improvement regarding the true-up of the ex ante models' equipment specifications, sequences, and controls to the as-built conditions observed during the PA verification site visit.	PAs should require their inspectors and engineers to perform on-site visits to visually verify that the proposed ECMs have been installed and are operating as intended and as simulated in the building model. It is recommended that the final approved model should be adjusted to physical "as-built" conditions observed during the verification site visit. "As-built" conditions include observed construction and equipment efficiencies and observed HVAC controls and sequencing. This effort should be performed in conjunction with revising the standard schedules with as-built building schedules.	All IOUs	Accepted	Onsite inspections are currently required and will continue to occur to verify proposed ECMs. California IOUs co-funded an energy modeling tool to allow inputs into the energy modeling tool for physical "as-built" conditions including equipment efficiencies, controls, sequencing and schedules. A webinar training was completed in April 2016 on this best practice and a modeling "FAQ" was developed to share with customers and design teams. All SBD projects moving forward are following these guidelines.	This is very good news for program implementation.
2	78		It is also recommended that the program administrator should make it mandatory for program participants to submit a Title-24 Acceptance Test Report before being paid an incentive. Title-24 acceptance tests involve inspection checks and performance tests to determine whether specific building systems conform to the criteria set forth in the standards and to the proposed building specifications and controls. The acceptance test reports can also be used to true-up building models to as-built conditions.	All IOUs	Other	PG&E agrees that a T-24 acceptance test report will be very helpful to determine whether specific building systems conform to the criteria set forth in the standards. The documentation collection for these projects is very extensive already but if an additional document can provide more clarity on the project, then PG&E will utilize it in the program. PG&E will investigate whether this additional document along with the commissioning report that we collect should be added to the required documentation checklist in program implementation.  SCE has concerns regarding requiring the T-24 acceptance test as a mandatory document for program participation. SCE's role is to ensure	Payback criteria is an issue that could benefit from a statewide discussion. ISP studies should be posted on the CMPA website so that CPUC staff has access.

						<p>recommended energy savings technologies are implemented as identified in the program documentation. The T-24 acceptance test report is already a compulsory part of final code permitting.</p> <p>This being said, SCE agrees the report as an optional document may be helpful for truing-up building models when performance of the windows, lighting and mechanical systems cannot be determined during post-installation inspection.</p> <p>Although it is helpful to the customer, SCG recommends that the T-24 acceptance test should be an optional document for program participation. This action can be done, if the post installation performance inspection cannot be completed.</p>	
3	79	<p>The Calculation Method discrepancy category accounts for savings differences due to different modeling methods used between the ex ante and ex post savings estimates. This discrepancy can include differences between ex ante and ex post load estimate, weather normalization, savings normalization, peak demand calculation methods and modeled equipment design. The primary issue regarding the Calculation Method discrepancy involves how the Energy Pro model is used in the SBD Program to both assess eligibility of the NRNC projects and to estimate ex ante savings.</p> <p>Energy-Pro uses two calculation modules related to the SBD Program: (1) NR T-24 Performance and (2) NR Performance. Both modules create standard and proposed building description files and estimate annual building energy performance using the DOE-2.1E building energy simulation program. However, there are distinct differences between these two modules that have been ignored or misunderstood.</p>	<p>To develop more accurate ex ante energy savings estimates, the evaluators recommend that: (1) when using Energy-Pro, program eligibility should be determined using the NR T-24 Performance module and ex ante savings should be determined using the NR Performance module; (2) as-built design schedules should be used in both the baseline and post-retrofit models; and(3) the run period should be consistent with the defined and applicable DEER peak periods.</p>	All IOUs	Accepted	<p>PG&amp;E has conducted a webinar training explaining this methodology to reviewers in April 2016 and the PG&amp;E sales and engineering team have been trained to communicate this methodology to design teams. The modeling FAQ referenced above also covers this topic.</p> <p>SCE and SoCalGas supports the recommendation. The new Savings By Design module in EnergyPro (v6.7 and later) currently follows the best practices. Eligibility is set by the compliance module, while savings are determined using the non-compliance performance model for as-built conditions. For non-EnergyPro projects, a similar protocol is required.</p>	<p>Custom rulebook and QA/QC processes are welcome steps to improving GRRs. The custom rulebook may be useful as a collaborative effort among the IOUs. Information flow internally at the IOUs is critical, with regard to rulebooks, QA/QC determinations, FSR examination, and other areas affecting the overall process, procedures, and savings claims.</p>
4	79	<p>The Inappropriate Baseline discrepancy category is applied to instances where the baseline model does not reflect 2008 Title 24 or ACM guidelines for establishing standard/baseline model characteristics.</p>	<p>It is recommended that the PA modelers verify that the baseline model, specifically the mechanical and HVAC systems, is in accordance with the Title-24 ACM manual. This recommendation and the recommendation</p>	All IOUs	Accepted	<p>Energy Pro 6.7 was developed to follow the ACEEE white paper methodology ("How to Simulate Energy Savings of Non-Residential New Construction Savings by Design Program in California" written in 2014 by Zhiquin Zhang and</p>	<p>Applying lessons learned to similar projects is also a focus of feedback from the ex ante team. We do expect to see improvements in this respect generally.</p>

		The primary issue regarding the Inappropriate Baseline discrepancy is similar to the issue discussed for the Calculation Method discrepancy – how Energy Pro is used in the SBD Program to create the standard/baseline model <sup>37</sup> . Neither of the standard building models created by the two Performance modules in Energy Pro is appropriate for use as the baseline model for the SBD Program. The NR T-24 Performance module uses T-24 standard schedules in both the standard and proposed models while the NR Performance module uses the current year as the run period and as-built mechanical systems in the baseline model.	given in the Calculation Method section above are the most critical improvement areas that could be used to improve ex ante savings estimation. This adjustment requires proficient modeling experience, with the modeler able to work outside of the Energy Pro program, using the DOE-2 input files (e.g., .doe files) and the ACM manual to verify that the standard model generated by Energy Pro applies the Title 24 and ACM rules correctly.			Amit Kanungo, DNV GL and Peter Jacobs, Building Metrics, Inc.). An additional SBD module was built so energy modelers can verify the baseline model, specifically the mechanical and HVAC systems in accordance with the Title-24 ACM manual. A formal SBD training was conducted in April 2016 and this methodology is currently in practice.	
5			The recommended modeling adjustment process detailed above is a manual, labor intensive process and can be very tedious at times. If the PAs desire to continue to use Energy-Pro in the future for energy savings estimation (as opposed to T24 compliance), we suggest the PAs explore modifications to the Energy-Pro or any other PA selected software tool in order to automate the recommended modeling process and automatically generate appropriate energy savings.	All IOUs	Accepted	Modifications to EnergyPro have already been completed. In addition, the SBD statewide team has created a SBD rule set to enable additional modeling software options for the marketplace. Energy Pro 6.7 (2013 code) and 7 (2016 code) have the available SBD module that follows this recommendation.	Aren't ex ante savings claims in fact projections of what will be found ex post? In any event the recommendation is to conduct thorough post retrofit inspections and to make sure documentation is complete.
6	81	The evaluation team has noticed evidence suggesting that the earlier the involvement with the program, the greater influence that the program has on the project.	One possible solution to reduce free ridership is to shift program delivery to attract earlier project involvement. One suggestion is to reduce incentive payments or even disqualify projects that have completed and committed designs before program interactions began. Conversely, greater incentives could be extended to projects that get involved with the program in the early design stages. This scenario would require some sort of “litmus test” to determine whether participants could be influenced by the program or not. This approach could separate out the projects that are “applying for an incentive for a pre-determined design” from those that are willing to consider design alternatives.	All IOUs	Accepted	PG&E is disqualifying projects where the PA connects with the customer after the design phase. PG&E only qualifies projects in the phase where design changes are still feasible. SCE is making a concerted effort to get involved with projects at earlier stages, and disqualify projects where SCE has not established substantial influence over the proposed design. SoCalGas interacts with the designers and owners in the early stages of the design. SoCalGas disqualifies projects where SoCalGas cannot give design influence over the projects	We do not disagree that conditions change over time, and are recommending short term monitoring and other activities to true up the ex ante estimates with the savings from the measure as installed (not projecting what will be found in later conditions, namely evaluation efforts) . The recommendation is for increased data collection of operating parameters affecting actual realized savings and adequate post-install M&V, not endless post-install M&V, for periods that are fully representative of annual energy savings and peak demand savings. The IOUs are free to conduct a study on the program costs associated with conducting post-install M&V and the effect on the uncertainty and accuracy of savings projections. The difference between ex ante and ex post is clear from the evaluation reports, which suggests that IOUs could benefit from the information obtained through appropriate post install M&V.

7	82	For the NRNC Whole Building projects, baseline designations are usually based on either Title 24 code or Industry Standard Practices, and this designation, which is driven by type of building, will affect estimated savings. For project baseline designations in the NRNC Whole Building Program, the evaluator and PA conclusions were identical with the exception of one case. A site designated by the PA as a healthcare facility was in fact deemed ex post as a medical office building that did not need to comply with healthcare specific ISP, but rather the Title-24 building code. This baseline change from healthcare ISP to T-24 building code had a drastic impact on the GRR of this site.	The evaluator recommends reviewing baseline building use type selection and confirming that it is the most appropriate option while generating the energy model.	All IOUs	Accepted	The healthcare baseline study was published and is utilized in projects where applicable. Baseline building use type is evaluated when generating the energy model.  SCE agrees with the recommendation and has previously incorporated this best practice into our project review process.	We acknowledge the need to balance the accuracy of energy savings claim with timely payments, however, as an example, PGE had a project with zero savings in 2014 because the claim was made before the installation was commissioned fully; other projects had been claimed but had not achieved stable operation or were not operating as expected. As specified in row 14, IOUs should strive for more thorough and representative post installation inspection and M&V. In several cases, there are detailed pre-installation M&V efforts for representative periods, but post-installation M&V is severely limited. Energy use in both periods is, of course, needed for accurate energy savings.
8	82	For one of the PG&E sites, implementer-provided ISP documents were not available in the ex ante review and had to be requested for the ex post analysis. Most NRNC Whole Building Projects rely on whole building simulation software that generates the baseline to the appropriate Title 24 standards.	The evaluator recommends including all baseline documentation files such as implementer ISP files used in the project design in the project file.	All IOUs	Other	While the SBD team acknowledges that it is important to document the source of the ISP baseline documents utilized to determine the baseline, we find that the amount of information collected for an SBD project is already very large. Energy Pro 6.7 and the latest methodology as outlined in the ACEEE white paper currently requires inputs for actual operating hours, equipment specs, demand loads, etc. As such, further research may be needed to determine whether existing documentation as collected be sufficient.	See comments in [items 6 and 7]. We are recommending increased identification of conditions that cause savings estimates to increase or decrease, and make adjustments based on those post-installation findings for all projects, not only those projects that go through the 'Operating Report Review' process. Too often, the post installation report merely is only the verification that the equipment has been installed (and does not involve - or involves extremely limited - estimates of operating hours, load, etc.)
9	83	The baseline rating indicates whether or not the PA baseline conclusion was correctly identified. In most cases the appropriateness rating met expectations. The appropriateness of the baseline was on average higher than the documentation rating. Only 1 site received a rating of 1 or 2 for appropriateness, but 7 of the 26 measures received a score of either 1 or 2 for documentation. In several instances baseline documentation provided did not necessarily match the type of equipment being modeled. In other cases it was not clear which parameters or models were intentionally revised, and there was no detailed accompanying documentation.	The evaluator recommends including more details from any project equipment changes and updating documentation if project scope changes over the course of construction in the project file.	All IOUs	Accepted	SBD team agrees with the recommendation.  PG&E has conducted training in April 2016 to reflect this recommendation.  SCE has previously integrated the use of a whole building summary report narrative. If the scope of work changes, the as-built conditions are noted in the verification report. The building model is then updated with as-built conditions. Also included in the documentation are the "as-built" submittals.	OK.

10	83	<p>The EUL assessment is an examination of PA tracking data and project documentation on EUL values. The most notable difference between PA EUL data and evaluator EUL findings was the fact that PG&amp;E tracking data did not include any EUL values. All site EULs were populated with zeroes. In addition not a single project had the EUL documented in the project documents. This resulted in large differences between PA and evaluator EUL designations. For our analysis, PG&amp;E EUL values were obtained from PG&amp;E 's 2013 SBD E3 calculator. The SCE and SDG&amp;E EUL values that existed in the tracking data were not accompanied by a source, therefore the evaluator was not able to determine how the PAs calculated project EUL values. It was not possible to further investigate EUL differences without this data.</p>	<p>EUL is crucial for lifecycle savings calculations, and the evaluator recommends collecting EULs for each measure of the Whole Building project from DEER and calculating the project EUL by weighting them by measure savings. Then this weighted average EUL should be assigned to the project level for the Whole Building projects to estimate project life cycle savings. Additionally, it is recommended to include EUL as a required field on the utility incentive worksheet or on project application.</p>	All IOUs	Other	<p>PG&amp;E posts the EUL in the tracking data for SBD whole building projects and it is not located in the project file. The EUL for whole building projects is a weighted average of 16 years based on the EUL of HVAC, lighting and envelope measures.</p> <p>SCE and SoCalGas appreciates the recommendation and as such reports EUL as a straight average measure EUL. The value is included in uploaded documentation. The reason for the straight average rather than the weighted average is EnergyPro and other software packages do not display savings for each whole building by individual measure (simulation results are not compared as parametric runs), so it isn't possible to take a weighted average to determine the overall EUL.</p>	<p>Pump efficiency and the method of claiming savings is an issue being discussed with the ex ante team. We are requesting use of more testing (as opposed to estimates) for important parameters like pump efficiencies. It is useful that PG&amp;E is providing real time training, and we urge you expand those efforts to provide program manual addenda for documentation. We recommend that PG&amp;E make the initial efforts to produce more comprehensive and valuable pre and post-installation inspection reports.</p>
11	83	<p>PA cost documentation was provided for all 26 measures. For this assessment only incremental costs are relevant. Program rules identify incentive caps relative to incremental cost, which makes this cost element crucial for appropriate incentive calculations. Evaluator examination of the cost documents indicate that while incremental cost data existed, it did not always meet quality or appropriate expectations. This is evident in the fact that 17 of 26 measures received as score of 1 or 2 for incremental cost documentation rating, usually due to unreferenced sources or unclear cost data (i.e. not separated out by measure, but just a total reported incremental cost). Some referenced sources were the names of previous implementer project documents, which were not accessible to evaluators to verify the incremental cost claims.</p>	<p>We recommend standardizing incremental cost documentation where both the baseline and the installed measure cost data should be provided along with their reference sources to validate the incremental cost estimates.</p>	All IOUs	Accepted	<p>The SBD team agrees.</p> <p>PG&amp;E is interested in conducting an EM&amp;V study that determines the average cost per measure in commercial buildings per square foot to help projects determine a baseline cost to build to T24 standards. However, PG&amp;E has many other studies that are in a higher priority at this time.</p> <p>SCE agrees with PG&amp;E that further cost studies are needed to help determine incremental measure costs on a more general level. The results of the study are beneficial only if the CPUC supports and approves the results of such a study. With the CPUC's approval of such a report would reduce the time and resources needed to capture this type of information.</p> <p>While it's clear that incremental cost is an important component to document, in practice, it isn't always practical to assume that incremental cost can be calculated by subtracting the cost of the proposed equipment from the cost of code compliant equipment. Many non-energy impacting material costs (such as quality of interior/exterior finishes or light fixture styles) drive costing of the overall project. In addition, builders are seldom willing to share their costs</p>	<p>Noting that despite efforts, the same issues were identified in the 2013 evaluation report as in the 2010-12 evaluation report. We expect to see more improvement going forward due to ongoing collaboration with the ex ante team as well as the efforts undertaken by PGE and documented here.</p>

						and reveal their margins in the very competitive new construction environment. SCE welcomes the dialogue with the CPUC to find workable solutions to this issue.	
12	84	Overall the PA incentive calculation methods and incentive caps agreed with evaluator findings. Tracking data and project documents for every project scored a 100% for including incentive details. Based on information from project documents, all of the appropriate incentive caps were applied when necessary. Consequently, all PAs received a rating of 3.0 which is meeting the expectations for documentation for the incentive assessment category. However there were some large discrepancies between the tracking data incentive amount and the project documents incentive amount for some PG&E and SCE sites. Having no further insight into the tracking data incentive values it appears there could be some significant inconsistencies in how design team incentives and other incentives such as LEED and Commissioning kickers were documented. It is also possible that improper data calculation and entry occurred.	The evaluator recommends having more transparency and thoroughness when documenting incentives. Incentive amounts in the project documents should match what was listed in the tracking data.	All IOUs	Accepted	The design team incentive is always 1/3 of the owner's incentive and the kickers utilize the kicker amounts stated in the handbook at the time of project commitment. PG&E will ensure that these incentive value methodology sources are clearly identified and spelled out in the reports.  SCE believes an adequate amount of documentation and "tracking" information is provided. However, SCE is willing to engage in further discussion to gain clarity on the issue being raised.  SoCalGas believes that there is proper documentation based on the statewide's handbook requirements. SoCalGas is open to discuss ways to improve the process.	OK.
13	84	Numerous savings models were not trued up to site findings even though the PA post verification indicated otherwise. Calculating savings using incorrect simulation modes, not using as built schedules, and not adjusting the as-found measure count in the PA inspections are some of the reasons for lower calculation method scores. These parameters significantly affect model accuracy and savings.	The evaluator recommends that the PAs conduct more post-installation measurement and more detailed post-installation verification, and include the updated inputs into their energy savings models and calculations so that the ex ante claims appropriately reflect as-found parameters.	All IOUs	Accepted	The SBD team has corrected this along with using as built drawings to true up the models. The SBD team is also using schedules, set points and detailed post-installation verification inputs as found after the project is commissioned per the development of Energy Pro 6.7. The April 16 webinar training also covered using this methodology.	OK.