

Pacific Gas and Electric 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 Strategic Energy Management (SEM) 2021 2022 Impact Evaluation (DNV, Calmac ID # CPU00375.01)

The RTR reports demonstrate PG&E's plans and activities to incorporate EM&V evaluation recommendations into programs to improve performance and operations, where applicable. PG&E's approach is consistent with the CPUC Decision (D.) 07-09-043¹ and the Energy Division Investor-Owned Utility Energy Efficiency Evaluation, Measurement and Verification (EM&V) Plan² 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 PG&E 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), PG&E 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. PG&E believes this feedback will help improve both programs and future evaluation reports.

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: *Strategic Energy Management (SEM) 2021 2022 Impact Evaluation*
Program(s): Strategic Energy Management
Author: DNV
Calmac ID: CPU00375.01
ED WO:
Link to Report: [CPUC Group D SEM Impact Report Final CALMAC.pdf](#)

| MANAGEMENT APPROVAL AFTER REVIEWING ALL IOU RESPONSES | | |
|---|-----------------------|-----------|
| Name | | Date |
| PG&E | Paolo Pecora, Manager | 8/28/2024 |
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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. |
| Analysis methodology | | | | | | |
| 1 | 35 | <ul style="list-style-type: none"> Bottom-up approach calculates SEM energy savings on the measure level. However, the majority of the implemented SEM projects are BRO measures that generate interactive effects which impact other systems in addition to the system targeted by the measure. This impact is often difficult to calculate accurately at the measure level and could only be captured by the overall impact on the site's total energy consumption. Bottom-up approach uses measure-specific formulas, inputs, and assumptions, to calculate the measure-specific savings. Since installed measures could vary significantly, this poses a complication in ensuring that all measure calculations meet the appropriate rigor to calculate accurate savings. The overall bottom-up savings are calculated by aggregating the energy savings of each installed measure. The participant is expected to provide documentation to supplement the savings calculation of each measure. This includes documentation of quantities, sizes, hours of operation, and any other measure-specific parameter. Additionally, when bottom-up sites are selected for evaluation, they are expected to provide supplemental information as requested by the evaluators. This includes but is not limited to trend data, photographs of nameplates or equipment, verification of quantities (such as invoices), and any other measure-specific documentation. This creates an additional burden on program participant to provide such documentation when using the bottom-up approach compared to the top-down approach. | <ul style="list-style-type: none"> Prioritize calculating energy savings using top-down approach to bottom-up calculations. Bottom-up calculations should only be used when a top-down model is proven to not be feasible. Prioritize identifying and addressing issues that impede creating a valid top-down model as early as possible during SEM participation. Attempt top-down models and include them in the project files even when using bottom-up calculations. This will allow the PAs and the evaluators an opportunity to review those models to confirm the reasons for using bottom-up calculations. When using a bottom-up approach, SEM participants should take the following actions: <ul style="list-style-type: none"> Continue providing thorough documentation to justify calculating the SEM savings using bottom-up calculations. Use on-site metering and trend data to determine the most accurate values for parameters used in measure-level calculations. Using as-built values lead to accurate savings estimation. Provide thorough documentation of all inputs and parameters used in bottom-up calculations. Expect and prepare to fulfil data requests made by the evaluators to validate measure-specific parameters. | All | Accepted | <ul style="list-style-type: none"> Both of our Program Implementers currently follow this practice not only because bottom-up calculations create more effort and cost burden on these projects (than top-down modeling) but savings are usually left on the table due to conservative bottom-up calculation approaches. Implementers already do this early on (i.e., Prioritize identifying and addressing issues that impede creating a valid top-down model as early as possible during SEM participation). PG&E can institute an additional early QC step when bottom-up calculations are identified in year 1 engagement. The SEM M&V Guide allows leeway for certain complex sites to bypass top-down modeling when experience has shown that with certain customer characteristics attempting various top-down models is futile. Our current process requires implementers to keep track of first year modeling complications that will continue through all SEM engagement years, and either submit the failed models or supply the Notifications of Bottom-Up (BU) calculations with a narrative. PG&E recommends that the term "SEM Participant" be clarified if it is meant to mean both implementers and participants. PG&E is in agreement with the recommendation to use on-site metering and trend data to determine the most accurate values for parameters used in measure-level calculations and notes while many projects already comply, there is opportunity to improve. PG&E is generally leaving energy savings on the table when bottom-up calculated EPIAs are employed compared to the preferred top-down methods; BU methods require significantly greater engineering, modeling and reviewing, all of which increase program costs. PG&E recommends discussions with Commission Staff and other PAs during statewide SEM discussions to understand the requirement for more thorough documentation, especially if it leads to additional work and burden. PG&E is committed to continue fulfilling all DRs in a prompt manner. |

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| Savings calculation considerations | | | | | | |
| 2 | 36 | <ul style="list-style-type: none"> Savings annualization carries a significant savings miscalculation risk as sites' operations and production during the annualization period may be misrepresentative of typical operations over a full year. Savings annualization is not consistent with the SEM's performance-based approach to estimating savings using billing analysis, and it creates analytic difficulties in truing up savings in subsequent years. | <ul style="list-style-type: none"> Follow the SEM M&V guidelines which recommended limiting the annualization to only when the model is being retired or a customer will not be participating in the SEM program after the current reporting period, with PA authorization. Hence, annualized savings will be rejected when annualization is likely to produce inaccurate annual savings, such as seasonally impacted savings, or where savings are not steady from time period to time period, such as shutdown-type measures. | All | Accepted | Per 2022 guidance, PG&E began to use the Avoided Cost method to model/calculate savings and by 2024 have converted all participants over to this method except when the customer has concluded their final year of SEM engagement or for other special cases, where a reason is provided. |
| 3 | 38 | <p>Model adjustments performed by the DNV team accounted for 27% of difference between forecasted and evaluated savings. The DNV team reviewed all top-down models that were used by SEM participants to calculate savings for projects implemented in PY2021/2022. Overall, the DNV team determined that the sites that employed top-down models were consistent and well-developed. However, the DNV team identified several models that required adjustments to improve the model statistical significance, reflect typical operation, and calculate more accurate savings. To achieve these model's improvements, the DNV team made site-specific model adjustments which included:</p> <ul style="list-style-type: none"> For models that experienced operation changes due to COVID but did not appropriately account for the reduction in energy consumption due to COVID, the DNV team adjusted the models by either adding a COVID indicator or by removing the impacted periods from the reporting period. The DNV team implemented this change to ensure that only the savings associated with SEM implemented projects are claimed. For models that accounted for inconsistent shutdowns by using an indicator of 1 or 0 to reflect whether a specific period experienced shutdown, the DNV team adjusted the model to include the actual days of shutdowns since the energy impact of shutdowns varies depending on the duration of the shutdown. For models that used different baselines to calculate the savings for the first and second reporting periods, the DNV team calculated the savings for both reporting periods using the baseline that showed more accurate representation of the sites' typical operation. The DNV team verified this by comparing the statistical significance of each model and by any additional intel collected during the site interview. For models that used included data points for variables that were beyond the ±10% of the energy baseline data set and fell outside of the standard deviation limit, the DNV team deemed those data points as outliers and removed them from model consideration. For models that used variables showing high correlation, the DNV team verified the correlation by reviewing the project documentation and collecting additional information during the site interview to understand the sites' operation. When verified, the DNV team either consolidated variables | <ul style="list-style-type: none"> Follow the SEM M&V guidelines on creating top-down models and assess their validity. Below are some examples of the steps to take in ensuring the M&V guidelines are followed: <ul style="list-style-type: none"> Ensure that the model is reflective of the facilities' typical operation for both baseline and reporting periods. Ensure that any short-term changes (such as shutdowns) are included in the model as accurately as feasible. Including the actual days of shutdowns results in a higher correlation with energy consumption than simply using an indicator of either 1 or 0. Investigate the reasons for data points that reflect high residuals or fall outside of the range of the variable statistical significance and adjust the model accordingly. Tracking and documenting sources of outliers is more feasible during the model development phase as variables are being actively monitored. Ensure that the model is using variables that are relevant and not correlated. Avoid using hard-coded values in the savings calculations. The use of hard-coded values prevents the participants, PA reviewers, and evaluators from tracking the sources of the used values and complicates the process of updating and validating model results. | All | Other | <ul style="list-style-type: none"> Due to the lack of data that explain energy usage trends or available participant data that does not correlate to energy use, top-down models are unable to reflect typical plant operations there is a need to attempt alternative methods, such as bottom-up calculations. All avenues to obtain key data are exhausted up until final reporting and prior to making the determination to move forward with bottom-up calculations. Additionally, PG&E continually monitor participants in case there are any significant static factor changes that could challenge the use of our models. When changes at the customer site occur, we use our best judgment to adapt or reject the model to account for those changes. Does the evaluation team have any guidance on specific steps that they would like to see taken in situations where the typical operation has changed between baseline and reporting periods? PG&E does not fully agree with the bulleted recommendation, "Ensure that any short-term changes (such as shutdowns) are included in the model as accurately as feasible. Including the actual days of shutdowns results in a higher correlation with energy consumption than simply using an indicator of either 1 or 0." While PG&E agrees with the first sentence, we do not agree with the second sentence the way it is written. An example might be helpful for us to understand this point better. When we use an indicator variable, to model a shutdown period for example, the days are still included in the model. In addition, we only use an indicator variable when it improves model accuracy. The way the second sentence is written does not align with our understanding of using indicator variables and therefore we do not agree with this recommendation. Furthermore, obtaining more granular (daily or hourly) details about plant shutdown periods is often complicated since customers do not track them or in some cases energy team members may not have been present during those shutdown periods to collect that data. Efforts to correlate the magnitude of shutdown (i.e. number of days or extensiveness of shutdown) are pursued with the participant as much as possible without overburdening them on investigations that may lead to an "I think we were shut down for a week 2 years ago in August, but I wasn't here for that" response due to lack of knowledge or bandwidth to pursue the data. If similar shutdowns happen in the reporting period and the residuals are overly high or low compared to the baseline shutdown period, those periods will continue to be investigated with the participant to determine what differences there may be between the baseline and reporting period shutdowns or if the resulting savings are derived from better shutdown practices due to SEM engagement. PG&E agrees with the recommendation to "investigate the reasons for data points that reflect high residuals or fall outside of the range of the variable statistical significance and adjust the model accordingly." Outliers should be continually checked during the reporting period, and documented as they occur so they can be correctly handled in the final M&V. CR: Any data points that fall outside the range of the variable statistical significance are reviewed and investigated with the participants. Since most models are looking at 1-2 years of baseline data with a finite lens of a single energy champion or small energy team, it is often difficult to determine a root cause for a single day/week/month at an extremely large facility using tens or hundreds of millions of kWh per year. Even during model development, these data points can be well in the past and any current and active energy team member investigating those data points may not have been employed by the participant at the time of the outlier. And even those that were employed at that time may not know the scale of the shutdown due to impacts across dozens or hundreds |

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| | | <p>that are directly connected (such as production of different units) or only included variables that improve the model statistical significance.</p> <ul style="list-style-type: none"> For models that included hard-coded values without referencing the source of those values, the DNV team regenerated the participant's model to compare the outputs. In case the regenerated savings did not match the hard-coded values reported by the participant, the DNV team referred to the regenerated savings. This issue was not common among the reviewed models; hence, the DNV team considered it an incidental error. <p>Overall, model adjustments conducted by the DNV team contributed 27% to the overall discrepancy between forecasted and evaluated savings, as presented in section</p> | | | | <p>of different departments across their facility.</p> <ul style="list-style-type: none"> PG&E selects model variables which are logically relevant, and testtests each variable for correlation in terms of variance inflation factor (VIF), as per the M&V guide. All model variables are investigated with the participant to determine their relevance and to determine if they make engineering sense based on facility operations. It is, however, possible to have two potentially correlated variables, such as production volume and shutdown days. While these variables may be statistically correlated to one another, they explain two very different ways that energy is being used at the participant facility. In most cases, the VIF between those variables should still be under 5, which is considered statistically different enough to not overpredict model calculations. However, variables with a VIF between 5-10 range can still provide significant insights into facility operations and should not be excluded from model considerations due to their multicollinearity, especially if they explain different modes of operations at the facility. PG&E makes every attempt to avoid hard-coding values by collecting reference variables in our assumptions, and use named ranges to facilitate easier auditing by reviewers. Our model files contain formula driven variables and equations that can back calculate from raw data. When this is not the case, please let us know and we can provide additional context or remedy the hard-coded value with the appropriate formula. The only instance where a formula may be overwritten is if the model runs into an extrapolation issue where baseline data is outside of the model range and needs to be capped at its maximum baseline value to avoid over- or under-estimating savings; this instance will be outlined in the analysis of data points outside of the valid baseline range. |
| Project documentation inconsistencies | | | | | | |
| 4 | 39 | <ul style="list-style-type: none"> The DNV team recognizes that the project documentation provided by SEM participants follow the sequential process of developing SEM projects from project initiation to savings claims submission. However, providing completion reports and savings calculation models that do not correspond to the final forecast savings claim does not allow for the validation of the final forecasted savings. | <ul style="list-style-type: none"> Update relevant project documents such as the completion report and the calculation models to reflect any changes implemented during the technical review phase. Include any updated models or final savings estimates in the project documentation package. | All | Accepted | Completion Reports (per M&V Guide 3.1 2022) are now included as part of the Final Report. |
| NTGR methods and results | | | | | | |
| 5 | 40 | <ul style="list-style-type: none"> While there are slight variations between fuels and PAS, the assumption that the NTGR of the SEM program is 1, essentially, stands. The convention is that CEDARS will incorporate a unique fuel-specific NTGR for each PA for calculating net savings. The CPUC may wish to consider authorizing a single statewide SEM NTGR value of 1 for both electric and gas savings, given the clustering of the results around 1. | <ul style="list-style-type: none"> Evaluators recommend using the combined SEM NTGR and to apply it to all measures whether capital or non-capital. The combined NTGR accuracy is superior to the capital NTGR alone. Attempting to apply separate NTGR values to capital and non-capital would require savings to be reported as capital and non-capital in CEDARS, adding an unnecessary administrative burden. A requirement for separate applications of a capital and non-capital NTGR could also lead to perverse incentives to classify more measures in the Opportunity Register as non-capital. | All | Accepted | PG&E agrees and supports this recommendation |
| 6 | 41 | <ul style="list-style-type: none"> The Opportunity Register is an important source of information for identifying measure types to support evaluation. The measure type field was well populated and was 90% accurate. Two other important fields, measure cost and measure savings, are not well populated in the Opportunity Register. Both fields can be used to inform EUL calculations and program cost-effectiveness and can aid in the customer's prioritization of measures. | <ul style="list-style-type: none"> Evaluators recommend that the program implementers populate the applicable fields for any completed measure with estimated savings and costs. The savings and costs are effective tools for customers to prioritize measures and can streamline identification of capital measures as the program scales. | All | Accepted | PG&E began doing this practice in program year 2022 and will continue moving forward. |

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| 7 | 42 | <ul style="list-style-type: none"> A comparison of the new SEM with the standard scoring method shows an increase of about 0.15 points in this round of research, reflecting the participant's valuation of the program. Because capital measures account for only about 16% of programs savings, the SEM NTGR changes only by 1-2%. For another program where the customer is less engaged or where other non-program factors are present, that same weighting might yield a lower score using the SEM algorithm. The method is not inherently biased upwards. | <ul style="list-style-type: none"> The DNV team recommends adopting the SEM survey instruments and SEM scoring method to estimate NTG for SEM capital measures in the future. | | Accepted | PG&E agrees and supports this recommendation. |