



WHOLE BUILDING UNIVERSAL AUDIT TOOL

SWWB002-01

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MEASURE NAME

UNIVERSAL AUDIT TOOL

STATEWIDE MEASURE ID

SWWB002-01

TECHNOLOGY SUMMARY

The Universal Audit Tool (UAT) is an online tool that provides a platform for educating and promoting residential customer engagement with household energy consumption that is expected to lead to lasting behavioral change and adoption of no- and low-cost energy efficiency improvements. It is offered to customers from California's Investor-Owned Utilities (IOUs) under different brand names. The UAT provides residential customers with advice on energy efficiency concepts and practices, insight into areas of high household energy use, and tips and suggestions for saving both energy and money based on responses to an online survey regarding household appliances, occupancy, and other dwelling characteristics. The UAT is designed dynamically in the sense that, the more information the customer provides, the more customized its recommendations become. Customers are encouraged to engage with the tool, set up plans, update the tool over time, monitor changes in energy use and dwelling characteristics, and through ongoing engagement, increase involvement with efficiency practices, gain more information about ways to save energy, and, in a recursive loop, become more efficient.

Each of the participating IOUs has its own branded version of the UAT whereby customers gain access by logging into their account via their respective IOU website. The online tools provide customers with information about their home energy usage and break downs into end-use components (such as space heating, domestic hot water, cooking, and other household appliances). Customers provide answers to questions posed about their home and energy usage patterns to further refine tips and advice. Based on the customer's profile and usage, tailored tips and recommendations promote and prioritize energy-efficient appliances, rebates, services, products and programs.

Each IOU has branded its UAT in a distinct manner (see table below). Some require customers to log in using a password and others do not, but all of them allow customers to create an action plan or energy savings plan and provide estimates of annual savings that they can expect to see by implementing each recommended energy-saving tip. The IOUs have continued to make changes to improve engagement and use of the tool through deploying various marketing strategies and adjustments to tool functionalities. The most significant recent changes to the tool across the IOUs are:

- Enabling one-click or single sign-on features to help customers be recognized by the tool if they are already logged in to their utility account
- Integrating the tool with links to other rebates and energy efficiency programs for applicable measures
- Improving tips to be more helpful and drive customers to programs
- Increasing co-branding with ENERGY STAR®

Investor-Owned Utility	Universal Audit Tool Brand
Pacific Gas and Electric Company	Home Energy Checkup
Southern California Gas Company	Ways to Save
Southern California Edison	Enhanced Energy Advisor Tool (EEAT)
San Diego Gas and Electric	My Energy Survey

Savings Determination

This description of savings determination is not intended to be an exhaustive discussion of the methods and processes to be used but rather a broad overview of the approach. There are several critical areas of methodology that will require close collaboration between the IOUs, their consultants, Commission staff, and their consultants to finalize over the next one to two years. Some areas for collaboration were identified in the development of the three versions of the work paper plan (WPP) that preceded this document include:

- Identification comparison groups that can be shared for the purposes of Early M&V and impact evaluations;
- Optimal methodologies to ensure that savings are not double-counted between UAT and Home Energy Reports, UAT and other downstream programs, and UAT and the Upstream Lighting Program, and
- Best approaches to reconcile the demands to meet savings reporting deadlines, adhere to requirements to report savings in the year that customers engage with the online audit tool, and to determine savings using consumption as measured at the meter.

Given the need for close collaboration to address these issues, we foresee that this work paper will undergo substantial revisions over the course of the next year as greater clarity on these (and other) critical issues is achieved. As such, we view this initial version of the statewide UAT work paper as a living document.

Quasi-experimental design

The fundamental approach for estimating savings resulting from customer participation in the UAT will be quasi-experimental design (QED). QED is a between-subjects approach that involves comparing the energy consumption of the participant population¹ to that of a control or comparison group (that is, similar customers who did not). The “gold standard” for a between-subjects methodology is a randomized control trial (RCT), in which a group of eligible customers is randomly assigned to treatment and control conditions and can be shown to be statistically equivalent before participating. This research design is currently used to determine savings for Home Energy Reports (HER).² Random assignment ensures that

¹ Consistent with the most recent impact evaluation of the UAT, participants can be classified into two levels of engagement. Low engagers simply browse the tool, in some cases fill out surveys on the tool, but take no further energy savings actions. High engagers have more extensive engagement with the tool and create action plans to get tailored energy savings recommendations. See DNV GL (2017). Universal Audit Tool Impact Evaluation – Residential. California Public Utilities Commission. CALMAC ID CPU160.01.

² See SWWB004-01-Home Energy Reports, recently submitted for consideration by the ex-ante team.

the only factors differentiating subjects in treatment and control conditions is the treatment itself: the comparisons of the two groups post-treatment can be attributed to the treatment itself. Given that participation in the UAT is voluntary—that customers must elect to take the online audits—it is not possible to use an RCT methodology. Customers decide to engage with the online tool—they self-select themselves into the treatment group—so the analysis of pre/post energy use will reflect self-selection (the intrinsic characteristics that lead customers to engage with the tool) and may lead to biased estimates of savings. The objective of matching customers that engage with the tool to customers with similar observable characteristics (particularly energy use and location) to comprise a comparison group is to approximate an RCT design and thereby to minimize self-selection bias (although it will never eliminate it completely).

Since RCTs are generally not possible for opt-in programs,³ a comparison group must be developed from the non-participant population. This type of study approach is often called a “quasi-experiment” because it seeks to approximate an experimental design as closely as possible. The control/comparison group’s energy consumption during the time period studied comprises the base case, and helps evaluators ensure that savings attributed to the EE intervention are not in fact attributable to other, unrelated causes such as naturally declining energy usage or economic factors.

The use of a quasi-experimental, difference-in-differences design with a matched comparison group represents best practice for this type of “opt-in” program design as discussed in the Chapter 8 of the Department of Energy’s Uniform Methods Project⁴ and a Lawrence Berkeley Labs report sponsored by the State and Local Energy Efficiency Action Network (“SeeAction”).⁵ The methodology was employed in the most recent impact evaluation of UAT.⁶

Subsequent to determining UAT savings, additional analyses will be conducted to ensure that savings attributable to the UAT will not be counted by other IOU downstream or upstream energy efficiency programs. In large part, the techniques will be adapted from those documented in recent impact evaluations for IOU Home Energy Reports programs.⁷ As mentioned above, a more exhaustive treatment of the methodology will be presented in a subsequent draft of this work paper after collaboration with Commission staff and its consultants.

To determine savings for UAT, comparison groups will be developed using propensity score matching (PSM). The PSM technique mimics an RCT to the extent possible by selecting comparison group members based on their similarity to treatment group members. Similarity to treatment group members is based on a “propensity score,” which captures the likelihood that a customer engaged with the tool program, based on observable characteristics (including pre-participation energy usage). Once a suitable

³ Due to concerns about customer inequity, dissatisfaction and sample size/statistical power issues.

⁴ Agnew, K.; Goldberg, M. (2017). Chapter 8: Whole-Building Retrofit with Consumption Data Analysis Evaluation Protocol, The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures. Golden, CO; National Renewable Energy Laboratory. NREL/SR-7A40-68564. <http://www.nrel.gov/docs/fy17osti/68564.pdf>

⁵ State and Local Energy Efficiency Action Network. 2012. Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations. Prepared by A. Todd, E. Stuart, S. Schiller, and C. Goldman, Lawrence Berkeley National Laboratory. <http://behavioranalytics.lbl.gov>.

⁶ DNV GL. (2017). Universal Audit Tool Impact Evaluation – Residential. California Public Utilities Commission. CALMAC ID CPU0160.01

⁷ See DNV GL (2019). Impact Evaluation Report: Home Energy Reports – Residential Program Year 2017. CALMAC ID CPU194.01.

comparison group has been formed, energy savings attributable to UAT over the 12-month period following program participation will be assessed using a fixed effects difference-in-differences regression model. Checks will be made for potential double-dipping and deductions will be made from savings claims, as outlined in subsequent sections of this document.

Reporting approach and preliminary savings estimates

This work paper outlines an approach to assessing UAT savings that requires 12 months of post-participation metered energy consumption data (“meter data”). This requirement will present reporting challenges: currently, energy savings are required to be claimed in the same calendar year that EE measures are installed. In the case of UAT, this requirement means that savings must be claimed in the year in which a customer engages with the online audit tool. Observing this requirement leads to the need to report savings before 12 months of post-participation meter data are available for most participants until well after IOUs submit their Annual Reports.

The UAT measure shares this reporting challenge with programs and projects that use the normalized metered energy consumption (NMEC) approach to determine savings. To address this challenge, UAT savings reporting will align with the reporting processes developed for NMEC programs and projects. As of this Work Paper submission, that process will involve the two steps outlined below. This approach will be updated should the NMEC reporting process change. The savings reporting process is as follows:

1. A preliminary savings estimate will be reported for the group of customers engaging with the audit tool in 2019. This preliminary savings estimate will be based on average savings values determined from analyses conducted on UAT participants from a prior 12-month period, segmented by geographic area (e.g., baseline territory) and pre-participation usage (electric usage quartiles), as sample sizes allow.
 - a. Specifically, per-customer prior-year savings within customer segments will be multiplied by the number of current-year participants within each segment to yield the aggregate savings estimate for 2019.
 - b. A holdback will be taken from these kWh and therms savings estimates to ensure that savings reported by other IOU energy efficiency programs are not double-counted in the 2019 UAT savings claim.
 - c. These preliminary savings estimates will be included in IOU annual reports (and, depending on Commission staff guidance, may be included in quarterly reports as well). However, these estimates will not constitute savings claims and will be flagged to indicate that they are preliminary.
2. After the conclusion of PY+1 (that is, once 12 months of post-participation energy consumption data are available for all participants, IOUs have had sufficient time to conduct rigorous Early M&V, and the CPUC has had sufficient time to conduct impact evaluations, final, QED-based savings figures will be claimed and attributed to the year of installation.

MEASURE CASE DESCRIPTION

The Universal Audit Tool (UAT) is an online tool that provides a platform for educating and promoting residential customer engagement with their energy consumption that leads to lasting behavioral change and adoption of energy efficiency improvements. More specifically, the UAT provides residential customers with advice on energy efficiency, insight into areas of high energy use, and tips and suggestions for saving both energy and money based on responses to an online survey regarding

household appliances, occupancy, and other dwelling characteristics. Currently Oracle Opower is the UAT implementer for Pacific Gas and Electric Company and Southern California Edison. Aclara is the UAT implementer for Southern California Gas Company and San Diego Gas and Electric Company.

The UAT is dynamically designed because the more information the customer provides the more customized their uniquely tailored recommendations become. Customers are encouraged to set up Action Plans, update the tool, monitor changes, and then gain more information about ways to save energy in a recursive loop.

The measure case is defined as a customer that engages with the UAT tool. Consistent with the most recent impact evaluation of the UAT,⁸ data from the tool permits the identification of customers with low and high levels of engagement with the tool. The lower level of engagement characterizes participation with more limited interactions with the tool where participants mostly browse the website and, in some cases, complete surveys (audits) on the tool (possibly picking up information on savings), but do not take further action. The higher level of engagement is where participants create an Action Plan based on recommendations they get from the tool.

BASE CASE DESCRIPTION

The base case for this measure is defined as a residential customer that has been identified as a member of a comparison group for a given period of analysis. The change in energy consumption of the group of residential customers comprising the comparison group will be compared to the change in energy consumption of the group of residential customers comprising the treatment group (those customers that engage with the UAT (the treated customer)) for the duration of the analysis period. The base case energy consumption is the average of each residential customer's energy consumption assigned to the comparison group for the duration of the analysis period. Since savings are calculated by comparing usage between treatment and comparison conditions for a single post-treatment year for each program year separately, there is not a fixed base case.

Comparison Group Development

A propensity score matching (PSM) methodology will be used to construct suitable comparison groups (one for each cohort of customers) for the estimation of energy savings. We propose to work with the CPUC's impact evaluator so that the comparison groups may be used by IOUs to inform savings claim purposes ("Early M&V") and by the CPUC and its consultants for impact evaluations. The specific methods and processes for collaborating on comparison group formation and verification have not been finalized as of the submittal of this version of the work paper. We anticipate the submittal of a revision to this work paper as agreement is achieved on the details of comparison group formation and validation.

The PSM procedure will use a probit model to identify comparison customers who are most like UAT participants in terms of observable characteristics of energy consumption (primarily hourly load profiles and average monthly energy consumption). The probit model will estimate a score for each customer with the assumption that observable variables affect a customer's decision to engage with the UAT. A

⁸ See DNV GL (2017). Universal Audit Tool Impact Evaluation – Residential. California Public Utilities Commission. CALMAC ID CPU160.01.

probit model is a regression model designed to estimate probabilities – in this case, the probability that a customer would use the online tool. The propensity score can be thought of as a summary variable that includes all relevant observable information about whether a customer would engage with the UAT. We will match each customer in the participant population with the customer in the nonparticipant population that has the closest propensity score.

UAT participants will be matched to customers with similar energy consumption characteristics including, but not limited to pretreatment hourly load profiles and overall energy consumption patterns. To minimize the self-selection effect, matching will be restricted within narrow geographical locations and rate type (e.g., time-of-use, tiered rate, NEM, CARE, etc.). That is, a participant in one neighborhood will be matched to a non-participant in the same neighborhood. Additionally, we can leverage the availability of AMI data to match customers based on energy use that is more granular than monthly energy consumption as provided in monthly billing data. Using interval-level consumption data will allow customers to be matched based on additional observable variables that may be related to motivation to engage with the UAT, such as weather sensitivity or average daily load profile.

It's important to note, however, that the quality of matches can be impacted by the size of the treatment population. We will be careful to avoid impacting the success of the matching methodology by stratifying the population into groups that are too small to enable effective matching. Ultimately, we will test multiple propensity score matching models and stratification strategies and select the one that performs best under a series of statistical tests. In other words, the final matching model will be the one that selects a comparison group that is most statistically similar to the participant group during the pre-participation period. We will document the matching model selection process in the EM&V reports.

The final matched comparison group will be compared to the treatment group to ensure that the two groups are not significantly different with respect to several observable variables. First, the difference in pretreatment usage will be examined using a series of statistical tests. The output of these tests may resemble Tables 1 and 2⁹ below. These tables are representative of what we might expect to see from the evaluation of the UAT.

Table 1 is a mock-up of a possible output that includes the mean daily kWh per customer for each month during a pretreatment period. In each month, the p-value is greater than 0.05, so we would fail to reject the null hypothesis that there is no difference between the two groups. In other words, this table shows that there are no statistically significant differences in pretreatment monthly consumption between the treatment group and the matched comparison group.

Table 2 shows a comparison of a variety of customer demographics between a comparison group and a treatment group, along with p-values highlighted to indicate statistically significant differences. In this case, the treatment group and comparison group do not show statistically significant differences when comparing across most demographics (indicated by a p-value greater than 0.05). The two groups do show differences, however, among the “other” persona and two of the language preference designations. In this evaluation, it was concluded that these two differences were trivial, and the evaluators did not reject the comparison group. If more categories showed significant differences, the evaluators may have determined that the two groups were not sufficiently similar and proceeded to test an alternative matching approach.

⁹ Nexant. (2019). SCE Default Time-of-Use Pricing Pilot Interim Evaluation.

Table 1: Example of Matched Comparison Group Validation – Mean Daily kWh

Pretreatment Month	Mean Daily kWh			95% Confidence Interval		% Diff.	P-Value
	Treat	Comparison	Diff.				
Month 1	23.8	23.8	0.0	-0.1	0.2	0.2%	0.554
Month 2	26.7	26.6	0.1	-0.1	0.2	0.2%	0.474
Month 3	27.3	27.2	0.1	-0.1	0.3	0.4%	0.254
Month 4	24.9	24.9	0.0	-0.1	0.2	0.2%	0.547
Month 5	23.4	23.4	0.1	-0.1	0.2	0.3%	0.356
Month 6	25.6	25.5	0.1	-0.1	0.2	0.2%	0.547
Month 7	29.2	29.1	0.0	-0.2	0.2	0.1%	0.811
Month 8	31.6	31.6	0.0	-0.2	0.3	0.0%	0.904
Month 9	31.2	31.2	0.0	-0.3	0.3	0.0%	0.950
Month 10	27.9	27.9	0.0	-0.2	0.2	0.0%	0.960
Month 11	24.7	24.7	0.0	-0.1	0.2	0.1%	0.709
Month 12	22.7	22.7	0.0	-0.1	0.2	0.1%	0.717

Table 2: Example of Matched Comparison Group Validation – Customer Demographics

Observable Variable		Treat	Comparison	P-Value
Persona	Connected	17.9%	17.9%	0.913
	Constrained	16.0%	16.0%	0.542
	Disengaged	16.2%	16.3%	0.772
	Green Elite	27.4%	27.6%	0.263
	Pragmatists	14.5%	14.5%	0.665
	Other	7.9%	7.8%	0.032
Language	Non-Hispanic	0.0%	0.0%	0.000
	No Spanish	5.7%	5.8%	0.705
	Prefers Spanish	12.5%	12.4%	0.318
	Both	10.2%	10.2%	0.837
	Unknown	8.8%	9.0%	0.039
Demand Response Enrollment	EBPP	38.1%	38.1%	0.883
	EBPPWP	0.1%	0.1%	0.292
	PTR	1.0%	1.0%	0.215
	SDP	0.2%	0.2%	0.673
Other	My Account	45.9%	45.7%	0.158
	Single Family	61.5%	61.7%	0.412
	My Account	9.5%	9.5%	0.357

In addition to the comparisons of sample means illustrated in the two tables above, we will conduct tests of balance (such as examining the difference in the distribution of energy consumption between treatment and comparison groups). Groups will be compared in terms of average daily load profiles as well.

Each (treatment) customer who engaged with the UAT will be matched to one who did not (comparison), but each comparison customer could be matched to multiple treatment customers. One challenge in using matching for the UAT energy savings analysis is that customers may engage with the online audit tool throughout the calendar year, while savings must be reported for all customers engaging with the audit tool within one calendar year. To address this challenge, we will segment UAT participants into cohorts based on the month of their initial engagement with the audit tool within the calendar year. In other words, the “September 2019” cohort will be the group of customers which engaged with the online audit tool for the first time in 2019 during the month of September. Each cohort will have its own matched comparison group; however, the energy savings will be assessed with a single model across all cohorts.

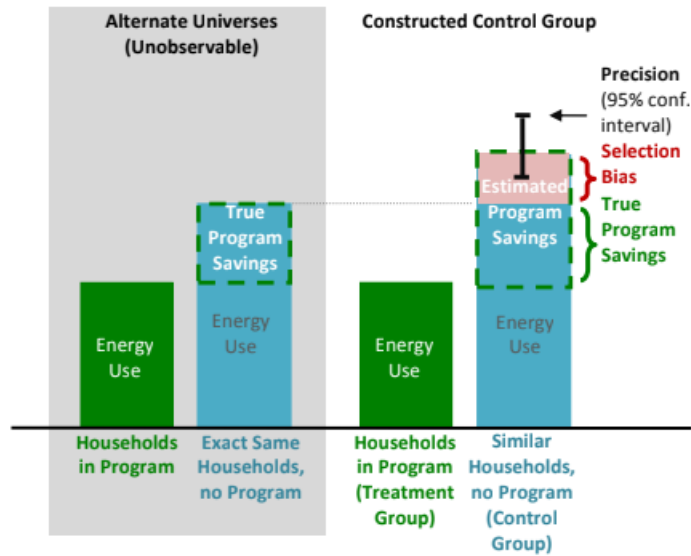
The IOU's evaluator will work with CPUC's impact evaluator on selecting and validating the final comparison groups. A detailed description of matching methods and selection of the final comparison group will be included in the evaluation report. Once there is agreement on the processes for comparison group selection and validation, this work paper will be updated to reflect the new information.

Acknowledgement of self-selection bias concerns

A significant concern when using matching to develop comparison groups for opt-in measures is the risk of self-selection bias. In other words, while it is possible to match customers based on prior energy use, it is impossible to match customers based on their motivation to engage with the UAT.

Self-selection bias can lead to either under or over-estimation of energy savings.¹⁰ Figure 1 shows an example of how self-selection bias can lead to an over-estimation of energy savings. In this example, energy use prior to program participation was similar in the treatment and constructed comparison groups. After treatment, the constructed comparison groups used more energy than the households in the program would have used in the absence of treatment. However, it is possible that some of the difference in energy use observed between these two groups is due to self-selection bias rather than due to the impact of the treatment. In this example, it appears that customers treated by the program may have been more motivated to engage with the tool because of unknown reasons that drove some of the observed program savings—even though the energy use of the similar households identified for the comparison group was similar prior to the onset of the treatment.

¹⁰ Typically, the concern in the evaluation of energy efficiency programs is that self-selection leads to an over-estimation of energy savings: program participants are those who are most likely to adopt incented measures in the absence of program incenting them to do so.

Figure 1: Example of Selection Bias in Between-Subjects Analysis¹¹

The DNV GL report acknowledged the risk of self-selection bias. While treatment and comparison groups may be perfectly matched on all *observable* variables (monthly energy consumption, for example), they may be different on some relevant and unobservable variables that can cause changes in the outcome variable of interest. Statistical matching using techniques such as PSM can attempt to mitigate this issue and closely approximate the results obtained from an RCT when:

1. Comparison groups are selected from intact populations that have characteristics like the treatment group;
2. Customers are matched on pre-existing measures of the outcome variable of interest as well as geographical location; and
3. The actual selection mechanism or reasonable measurements of it are included in selecting the comparison group or adjusting for selection after the fact.¹²

So, impact analysis using non-equivalent comparison groups *can* work, but it requires artful design and selection of comparison groups and sophisticated econometric analysis to adjust for selection.

¹¹ Customer Information and Behavior Working Group; Evaluation, Measurement, and Verification Working Group; Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations. 2012.

¹² Cook T, Shadish W. and Wong V. "Three Conditions under Which Experiments and Observational Studies Produce Comparable Causal Estimates: New Findings from Within-Study Comparisons", Journal of Policy Analysis and Management, 2008, Vol. 4 pp 724-750

CODE REQUIREMENTS

The UAT measure represents a set of measures based on altered customer behavior through period of analysis rather than savings from the installation of specific equipment or a control system or building feature. Consequently, there are no state or federal code requirements for this measure.

Applicable State and Federal Codes and Standards

Code	Applicable Code Reference	Effective Date
CA Appliance Efficiency Regulations – Title 20	None.	n/a
CA Building Energy Efficiency Standards – Title 24	None.	n/a
Federal Standards	None.	n/a

NORMALIZING UNIT

The normalizing unit for this measure is per household.

PROGRAM REQUIREMENTS

Measure Implementation Eligibility

All combinations of measure application type, delivery type, and sector that are established for this measure are specified below. Measure application type is a categorization based on the circumstances and timing of the measure installation. Each measure application type is distinguished by its baseline determination, cost basis, eligibility, and documentation requirements. Delivery type is the broad categorization of the delivery channel through which the market intervention strategy (financial incentives or other services) is targeted. This table also designates the broad market sector(s) that are applicable for this measure.

Note that some of the implementation combinations below may not be allowed for some measure offerings by all program administrators.

Implementation Eligibility

Measure Application Type	Delivery Type	Sector
BRO-Behavioral (BRO-Bhv)	DnDeemed	Residential

Eligible Products

Since the household characteristics that define the group of customers treated by the UAT for a specific analysis period (e.g., prior energy use, geographic characteristics) are unique, each analysis requires a separate analysis of energy savings and demand reduction observed at the set of participating premises.

Eligible Building Types and Vintages

This measure is applicable for single- and multi-family residential building types of any vintage.

Eligible Climate Zones

This measure is applicable in all California climate zones.

Savings Reporting

UAT savings reporting will align with the requirements being developed by the Reporting Project Coordination Group (PCG) for Normalized Metered Energy Consumption (NMEC) projects and programs. For annual reporting purposes, a single line-item comprising the sum of savings from all UAT participants during the program year will be reported. That is, savings for customers who engage with the tool between January 1 and December 31 of a given program year will be reported as the savings for that program year. This single-line-item approach aligns not only with the reporting paradigm for population NMEC programs, but also with the manner in which HER savings are reported. Data (such as PII) on individual UAT participants will be made available to evaluators as needed, again following the approach already in use for HER.

As discussed in the technology summary section, a two-step process is necessary due to the nature of the QED, because it uses 12 months of post-participation meter data.

1. *Preliminary estimates* of savings will be reported to the CPUC in the year of participation. In other words, IOU's 2019 Annual Reports¹³ will include estimates of savings for 2019 UAT participants.
 - a. These estimates will be flagged as such per a method agreed to by the Reporting PCG for NMEC programs and projects, so that they can be differentiated from final savings claims.¹⁴
 - b. The estimates will not be considered as final savings claims but will be intended to provide the Commission and other stakeholders with a timely view into a program's performance. In alignment with the NMEC reporting approach, these savings estimates would be counted toward IOU estimated portfolio goal attainment and cost-effectiveness for a given program year.
 - c. Savings estimates will be developed based on prior years savings, with adjustments for key customer characteristics (geography and pre-participation usage level) of the current year's participant group. The method of developing savings estimates is described in more detail in the *Electric Savings (kWh) and Gas Savings (Therms)* section below.
2. IOUs will make *final savings claims* for UAT after the QED analysis can be completed. As of the time of this writing, the final reporting schedule is under discussion, but ideally, these final savings claims would be reported as an addendum to the PY+1 Annual Report (to allow for 12 months of post-installation meter data to be collected for all participants in a given program year,

¹³ The IOUs will align quarterly reporting for UAT with the quarterly reporting methodology developed for population NMEC programs, which as of this writing remained under discussion in the Reporting PCG.

¹⁴ As of this writing, Commission staff have proposed using a different term than "savings claim" for these initial, non-meter-based savings estimates, in order to avoid confusion with final meter-based savings claims. The Reporting PCG has discussed ways to use fields in the current CEDARS specification to flag non-meter-based savings estimates for meter-based programs, so that these estimates can be reporting for Program Year 2019 and differentiated from deemed and custom ex ante savings claims, as well as final meter-based savings claims for programs and projects for which 12 months of post-installation meter data are available.

and a savings analysis to be performed). The approach to this analysis is described in the *Electric Savings (kWh) and Gas Savings (Therms)* section below.

- a. The final savings claims will be appropriately flagged so that it is clear that they replace (or true up, depending on the exact methodology agreed to in the reporting PCG) the estimate described under #1.
- b. Along with each final savings claim, the IOUs will make available to the CPUC an analysis report that describes how it was calculated.
- c. The final savings claim will be reported to the CPUC in alignment with the schedule the Reporting PCG determines for reporting final NMEC claims.
- d. As with NMEC programs and projects, ESPI payments for UAT will reflect final savings claims and not preliminary estimates.

The above narrative describes annual reporting. UAT will also be included in quarterly and monthly reporting in alignment with the approach agreed to for NMEC programs by the Reporting PCG. To illustrate how the reporting process outlined above would apply to a savings claim for the 2019 program year, the following steps would be followed:

1. December 2019: At the conclusion of the program year, savings will be attributed to Program Year 2019 will include all UAT participants that engaged with the tool between January 1 and December 31, 2019.
2. May 2020: Non-meter-based savings estimate for 2019 UAT participants is reported to the CPUC along with the 2019 Annual Report. The estimate will be flagged as such so it can be distinguished from final savings claims for other programs.
3. May 2021: Final meter-based savings claim for 2019 UAT participants is reported to the CPUC, based on post-installation meter data for all customers who used the UAT between January 1 and December 31, 2019. Non-meter-based savings estimate is reported for 2020 UAT participants (i.e., all participants engaging with the tool between January 1 and December 31, 2020).

PROGRAM EXCLUSIONS

Customers residing in master-metered multi-family dwellings, and other customers for which an IOU is unable to find suitable customers for a comparison group, such as customers with an insufficient amount of historical energy usage at the same address, can engage with the tool, but these customers will be excluded from the energy savings claims.

DATA COLLECTION REQUIREMENTS

For a customer who engages with the UAT to be eligible to be included in a UAT savings claim, a least one year of historical energy usage at the same address is required. Additionally, a suitable match of a participating household for the comparison group must be identified for a participant to be included in a UAT savings claim.

USE CATEGORY

Behavior

ELECTRIC SAVINGS (KWH) AND GAS SAVINGS (THERMS)

Electric and gas savings from UAT will be assessed using a difference-in-differences (DID) methodology following the completion and validation of the matching assignments. This method calculates estimated impacts by subtracting treatment customers' loads from comparison customers' loads in each day, month, or season after the treatments are in place and subtracts from this value the difference in loads between treatment and comparison customers for the same period in the pretreatment period. Subtracting any difference between treatment and comparison customers prior to the treatment going into effect adjusts for any differences between the two groups that might occur due to inaccuracies in the matching algorithms.

The DID calculation will be done using regression analysis. Customer fixed effects regression analysis allows each customer's mean usage to be modeled separately, which reduces the standard error of the impact estimates without changing their magnitude.¹⁵ A typical regression specification for estimating impacts is shown below:

$$kWh_{i,t} = \gamma post_t + \beta(treatpost)_{i,t} + v_i + \varepsilon_{i,t}$$

In the above equation, the variable **kWh_{i,t}** equals electricity usage during the period of interest. The index *i* refers to customers and the index *t* refers to the time period of interest. The estimating database would contain electricity usage data during both the pretreatment and post-treatment periods for both treatment and comparison group customers. The variable **post** is equal to 1 for days after a customer has interacted with the tool a value of 0 for days during the pretreatment period. The **treatpost** term is the interaction of treat and post and its coefficient **β** is a difference-in-differences estimator of the treatment effect that makes use of the pretreatment data. The primary parameter of interest is **β**, which provides the estimated demand impact during the relevant period. The **v_i** term is the customer fixed effects variable that controls for unobserved factors that are time-invariant and unique to each customer.

Energy savings will be estimated for natural gas and electric energy, both on a per-customer and aggregate basis. As discussed in the previous segment, comparison groups will be selected separately for each UAT cohort based on when each customer used the tool (defined by year and month). However, we will estimate a single savings model across all 12 cohorts for each month. The analysis dataset will include 12 months of pre-UAT data and 12 months of post-UAT data for each participant (and their matched control customer). Therefore, a customer who used the tool in January 2019 will not be included in the March 2020 savings estimate.

¹⁵ Standard errors are clustered to account for repeat observations from the same customer.

To allow enough time for data collection and analysis, we will estimate savings only through October 31 of the following year. This means that the savings estimate will not include a full 12 months of meter data for the group of customers who engage with the tool after October 31 in the program year of interest.¹⁶ Additionally, we will develop the matched comparison groups as soon as pre-UAT data becomes available. This will allow the estimation of savings to commence immediately following availability of post-installation data.

With this approach, aggregate monthly savings will be equal to the product of the per-customer savings estimate and the number of participants who were active and within their 12 month post-UAT window in that month. The final savings claim will be the sum of the monthly aggregate savings from January of the program year through October of the following year.

Addressing the Possibility of Double-Counting Savings Observed from the UAT

Engagement with the UAT may increase participating customer activity in other PG&E's energy efficiency programs. To ensure that the energy savings claimed by the UAT are not duplicative of savings claimed by other programs, it is essential to assess savings overlaps between the UAT and other IOU programs and subtract these joint savings from the UAT savings claims in order to avoid double counting. There are three potential sources of double counting that should be addressed:

- Customers participating in UAT may be more likely to adopt other IOU downstream measures.
- Purchase more efficient lamps rebated by IOU Upstream Lighting Programs.
- Customers participating in the HER program may be more likely to opt into the UAT.

To address the possibility that customers participating in UAT being more likely to adopt other IOU downstream measures, we will use the methodology developed for the Home Energy Reports program to estimate joint kWh and therms savings and make a deduction from the UAT savings claims to avoid double-counting of downstream savings.¹⁷ This methodology entails calculating savings achieved from the other downstream programs for each customer who received a rebate for the claim period by multiplying the number of days in the program year after use of the UAT and since installation of the rebated measure (as determined by IOU program tracking data) by an estimate of the measure's daily savings. This estimate, as determined by DEER load profiles for each measure, is dependent on the time of year the device is active: for example, an efficient AC unit would have much lower savings in December (low use) than in July (high use). Additionally, installed measures will only be assumed to achieve savings during their effective useful lifetime (EUL). The sum of the energy savings for rebated measures for the UAT participant group will be subtracted from the comparison group savings estimate to derive a best

¹⁶ If meter data for the time period after October 31 in the following year becomes available quickly, we may be able to include a full 12 months of data for the later cohorts.

¹⁷ For an illustration of this methodology as it has been applied to Home Energy Reports, see Section 5.2: Joint savings: downstream savings, DNV GL (2019). Impact Evaluation Report: Home Energy Reports – Residential Program Year 2017. California Public Utilities Commission. CALMAC ID CPU194.01.

estimate of the total double-counted downstream savings. These savings will be removed from the final UAT savings figures.

To address the possibility that customers participating in the UAT being more likely to adopt more efficient lamps being rebated or subsidized by the IOU Upstream Lighting Program (ULP), a different approach is necessary because ULP participation is not tracked at the individual customer level. This makes it impossible to measure directly the increased uptake of the ULP. Since no research to estimate the joint savings between the UAT and the ULP will be available to support an estimate of the influence of UAT on participation in the ULP, we propose to take a conservative approach in which we assume that the uplift of CFLs and LEDs among UAT participants is similar to that of customers in HER treatment conditions (on a per-customer basis), and that the same per-customer deduction savings be taken from the UAT savings claim as is taken from the HER savings claim.¹⁸

Finally, because HERs promote the UAT, it is likely that customers in HER treatment conditions are more likely than customers in control conditions to engage with the UAT. Not only is receiving reports from the HER program likely to increase the likelihood of opting in to the UAT, but certain HER reports actively promote UAT participation. Cross-participation in both HER and UAT can lead to a conflation of the impact of HER and UAT. Prior research on the potential overlap of HER and UAT savings have not found evidence of joint savings.¹⁹ However, we will follow the methodology laid out in this impact evaluation report to assess whether there are joint savings as a result of an overlap between HER and UAT participation, make a downward adjustment to the HER savings claim as required—as double-counted savings from rebated measures have been removed from the HER savings estimate—and assess the extent of potential interactive effects of HER on the effectiveness of the UAT measure

Final QED Savings Based on a Rolling Cohort of UAT Respondents

The basis for the final savings figure will be the sum of the savings figures calculated for each cohort as outlined above, less the potentially double-counted savings resulting from customer participation in other downstream programs.

The preliminary, non-meter-based estimates of savings provided to the CPUC for claims purposes will be based on the best available information and will include holdbacks to avoid overstating potential savings. In the Early M&V report, meter-based savings estimates will be reported for one full year in both per-customer and aggregate terms and will report relative precision at the 90% confidence interval. Percent savings will be reported as well. Savings will be estimated for both electric and natural gas energy and joint savings will be removed to avoid double counting.

¹⁸ Section 5.3: Joint savings: upstream programs of the DNV GL impact evaluations contains a detailed explanation of this methodology.

¹⁹ See section 3.4.9: UAT HER Overlap. DNV GL (2017). Universal Audit Tool Impact Evaluation – Residential. California Public Utilities Commission. CALMAC ID CPU0160.01

Load Shapes

A load shape indicates the distribution of a measure's energy savings over one year. As is the case with other key savings parameters, the CPUC establishes the values for load shapes that must be used for energy efficiency measures and provides them in DEER. Currently there is no load shape in DEER for the UAT measure. Until such time as a UAT load shape is published in DEER, or a weighted blend of approved DEER load shapes can be created using hourly data from participants and matched comparisons from the UAT program, the weighted blend of approved DEER load shapes that was calculated for the HER measure using a Proxy Tool developed by E3 Consulting will be used for UAT. The remainder of this section provides an overview of the Proxy Tool, its application to the HER measure, and information to substantiate the selection of the weighted blend of DEER load shapes used for HER for use with the UAT measure until such time that more empirical information is available.

The Proxy Tool is an Excel-based spreadsheet that calculates a weighted average of two DEER shapes that can be used to equal the avoided cost benefits that would have been attributed to the measure if that measure impact shape were a selectable DEER load shape. The Proxy Tool calculates the present value avoided cost benefits for a user-input hourly impact shape. This calculation is done using the same hourly avoided cost inputs that are used for the DEER shape "pre-processing", and the same weighted average cost of capital (WACC) discount rate used in the E3 Calculator.²⁰ The tool then compares the avoided cost benefits of the user-input impact shape to the avoided cost benefits for the official DEER shapes and calculates allocation factors for any pair of DEER shapes. By splitting the measure's annual kWh across the pair of DEER shapes using these allocation factors, the E3 Calculator will attribute present value avoided cost benefits to the measure that match what the measure would have received if its actual shape were included among the official DEER shapes.

The Proxy Tool can calculate allocation factors for any pair of DEER measures. The choice of DEER measures to use will not affect the result, as the allocation factors will always result in the correct avoided costs, and will always sum to 100%, so the tracking of total annual kWh savings is not distorted. Certain pairings, however, will likely have more appeal from a pure optics perspective, and for this optics reason, one should probably try to avoid pairings that result in a negative share and a greater than 100% share (unless one is modeling a storage or load shifting measure).

At its core, the E3 Calculator is a cost-effectiveness tool that determines the present value of lifecycle avoided cost benefits and lifecycle costs. When one assigns a DEER shape to a measure, that DEER shape determines the avoided cost benefits that will be attributed to the measure. The Proxy Tool simply calculates a weighted average of two DEER shapes that can be used to equal the avoided cost benefits that would have been attributed to the measure if that measure's impact shape were a selectable shape.

²⁰ The E3 Calculator, previously published as an Excel spreadsheet, has subsequently been replaced by a SQL tool referred to as the Cost Effectiveness Tool (CET). The CET has the same functionality as the E3 calculator used to evaluate the cost effectiveness of energy efficiency measures for the three California electric IOUs. The E3 Calculator was first developed in 2004 with a focus on simplifying the program submission and review process by using a limited set of pre-determined EE impact shapes. 19 DEER-based impact shapes currently included in the E3 Calculator were selected to fit over 80 percent of the expected EE program savings. However, for those measures that were not a good fit with the pre-determined shapes, the user was generally left with the chore of selecting the least bad fit.

The Proxy Tool can calculate allocation factors for any pair of DEER measures. The choice of DEER measures to use will not affect the result, as the allocation factors will always result in the correct avoided costs, and will always sum to 100%, so the tracking of total annual kWh savings is not distorted. Certain pairings, however, will likely have more appeal from a purely optics perspective, and for this optics reason, one should probably try to avoid pairings that result in a negative share and a greater than 100% share (unless one is modeling a storage or load shifting measure).

The allocation shares are calculated assuming the measures are installed at the beginning of the user-entered calendar year, and that EUL is integer years. While the E3 Calculator tracks installation quarters and fractional EUL years, we do not believe that level of detail is necessary for determining allocation factors, as we do not expect the factors would change significantly with those modifications.

As documented in the statewide Home Energy Reports Work Paper²¹ using the E3 Excel tool provided by E3 and a savings load shape provided by the vendor of the IOU Home Energy Reports programs, Oracle Opower, PG&E engineering staff allocated the HER program annual kWh saved to a pair of DEER shapes. These load shapes are *Res:DEER:RefgFrzr_HighEff* and *Res:DEER:HVAC_Eff_AC*. This combination of two load shapes enables the E3 Calculator to attribute present value avoided cost benefits to the HER program that matches what the measure would have received if its actual shape were included among the official DEER shapes.

There are two other sources of information that indicate that the blended load shape established for the Home Energy Reports program, absent empirical load shape data for UAT, is the best initial load shape for the UAT. Taken together, until such time as empirical data are available to derive UAT-specific load shapes, the weighted blend of DEER load shapes used for HER that was created using a Proxy Tool developed by E3 Consulting is appropriate for UAT:

- First, the UAT provides similar types of no- and low-cost energy savings recommendations to customers as does Home Energy Reports. In effect, the two programs are primarily behavioral in nature.
- Secondly, a customer survey conducted as part of the DNV GL impact evaluation of the UAT,²² is consistent with the load shape analyses conducted using the load shape data from Home Energy Reports. This UAT impact evaluation report indicates that participants:

“made more net changes in operating conditions of their home that reduce consumption and they currently have more energy saving measures implemented in their home like attic vents, ceiling fans, and programmable thermostats.”²³

The report also states that:

“Both SDG&E and PG&E electric savings estimates show a clear increase of savings during the summer months of 2014. Both series moderate during the winter months. In summer 2015, SDG&E shows a smaller increase in savings, whereas PG&E shows a slight reduction in savings. The strong summer savings demonstrated by early 2014

²¹ See Load Shapes section in SWWB004-03 Home Energy Reports Work Paper and associated appendix

²² DNV GL (2017). Universal Audit Tool Impact Evaluation – Residential. California Public Utilities Commission. CALMAC ID CPU0160.01

²³ Ibid. Page 59.

engagers are not repeated for either IOU. This could reflect different summer conditions, the addition of a different cohort of consumers joining the program in late 2014 or the increasing distance from the first engagement with the program. Despite the apparent decrease in cooling savings, savings do appear to maintain at a consistent level through the end of 2015. These findings suggest two things: that the program may effectively promote cooling savings opportunities when they are close at hand and that savings persist into a second year but appear to be less seasonally oriented.”²⁴

Given the foregoing, the load shape for UAT, absent further data, is the following blended load shape:

Res:DEER:RefgFrzr_HighEff and Res:DEER:HVAC_Eff_AC

GAS SAVINGS (THERMS)

The gas energy savings for UAT are developed with the same approach as the electric savings, except gas billing data is used in the analysis rather than electric billing data. See Electric Savings section for more detail.

PEAK ELECTRIC DEMAND REDUCTION (KW)

In theory, peak electric demand reduction could be calculated for UAT by comparing the pre/post differences in usage in the participant group to that of the comparison group. As of the writing of this work paper, the ability to conduct these calculations with statistical precision is not known. Consequently, for the initial savings reporting, the IOUs do not intend to file a claim for peak demand (kW) reduction. Once comparison groups are identified, the methods developed for the Home Energy Reports measure will be assessed for use with the UAT measure.

EFFECTIVE USEFUL LIFE

Effective useful life (EUL) is an estimate of the median number of years that a measure installed through a program is still in place and operable. Remaining useful life (RUL) is an estimate of the median number of years that a technology or piece of equipment replaced or altered by an energy efficiency program would have remained in service and operational had the program intervention not caused the replacement or alteration.

The EUL and RUL specified for the UAT measure are presented below. The EUL is set to one year from the most recent engagement with the online tool. This aligns with the one-year EUL for behavioral measures that use the NMEC platform indicated in Resolution E-4818²⁵

²⁴ Ibid. Page 39.

²⁵ See Resolution E-4818, issued March 2, 2017, footnote 2 “Only residential behavior programs have an effective useful life of one year.”

Effective Useful Life and Remaining Useful Life

Parameter	Home Energy Report	Source
EUL (yrs)	1.00	Rulemaking 13-11-005 filed November 13, 2015 (Assigned Commissioner and Administrative Law Judge's Ruling Regarding High Opportunity Programs or Projects, commonly referred to as "the HOPPs Ruling") and as reaffirmed in Resolution E-4592 filed October 11, 2018 (Approval of the Database for Energy-Efficient Resources updates for 2020 and revised version 2019 in Compliance with D.15-10-028, D.16-08-019, and Resolution E-4818).
RUL (yrs)	n/a	--

BASE CASE MATERIAL COST (\$/UNIT)

The base case assumes that no action is taken, and therefore the base case cost is equal to \$0.00.

MEASURE CASE MATERIAL COST (\$/UNIT)

The costs of the UAT itself fall within the definition of direct implementation non-incentive (DINI) costs in the Energy Efficiency Policy Manual. DINI costs include the cost of energy audits, licensing fees or IT development costs for program-specific applications for implementation, and direct-implementation specific IT costs. Thus, the measure cost for UAT is \$0.

The actions taken by customers in response to UAT are primarily behavioral, and the cost associated with these actions is assumed to equal \$0.00. Estimated savings overlaps with other portfolio measures—when they exist—will be subtracted from the UAT savings claims to avoid double counting in the energy efficiency portfolios.

BASE CASE LABOR COST (\$/UNIT)

The actions taken by customers in response to UAT are primarily behavioral, and the labor cost associated with these actions is assumed to equal \$0.00.

MEASURE CASE LABOR COST (\$/UNIT)

The actions taken by customers in response to UAT are primarily behavioral, and the labor cost associated with these actions is assumed to equal \$0.

NET-TO-GROSS (NTG)

The net-to-gross (NTG) ratio represents the portion of gross impacts that are determined to be directly attributed to a specific program intervention. As reflected in Resolution E-4818²⁶ (E-4818), Commission

²⁶ California Public Utilities Commission (CPUC). 2017. *Resolution E-4818. Measure level baseline assignment and preponderance of evidence guidance to establish eligibility for an accelerated replacement baseline treatment*. Issued March 2, 2017.

Staff assessed available data sources for updates to add appropriate NTG values for use in accelerated replacement and normalized metered energy consumption (NMEC) measure and project installations. The NTG updates reflected in E-4818 follow methods and assumptions adopted for use in establishing energy savings goals for the IOUs as adopted in Decision 17-09-025²⁷ which differentiates above-code and to-code net savings values.

Projects that use NMEC to calculate energy savings, by definition, use an existing conditions baseline for energy savings calculations. For NMEC projects which install a combination of measures in residential single-family homes, a default NTG value of 0.85 applies.²⁸

The sole residential program that uses a randomized control design (RCT), Home Energy Reports (HER), encourages customers to install no- and low-cost measures and to change behaviors related to energy use.²⁹ In this respect, HER is similar to UAT.³⁰ In its use of an opt-out design, households participating in the HER program are randomly assigned to either to a treatment group or to a control group, thereby eliminating discernable differences between the two groups, and therefore the estimated impacts, calculated by comparing the pre/post intervention differences in energy use between the treated and control groups, represent “net” impacts.³¹ Similar to the UAT program, savings from equipment purchases that have been rebated through another utility program are excluded from the HER savings, so any NTG adjustments are applied to the savings for those measures, rather than to the savings for the HER program. Consequently, the NTG established for programs using an RCT design is 1.0.³²

The quasi-experimental design methodology used to calculate savings for UAT is similar to, but not identical to, the RCT methodology. Unlike in the RCT methodology, participation in UAT is at the choice of the customer, and the decision to engage with the tool may be tied to the intrinsic characteristics of the group of the subjects of this group. Therefore, estimated treatment outcomes will reflect self-selection bias. The use of a matched comparison group is the process that aims to circumvent such bias by identifying comparison subjects whose characteristics closely match those of the opt-in participants. Matching methods try to replicate RCT designs by selecting opt-in and comparison group subjects that are balanced in key observable characteristics. Balance is indicated by identical distributions of these characteristics of both groups. In the methodology to be employed to estimate the treatment effects of UAT, propensity score matching, the objective is to reduce self-selection bias.

²⁷ California Public Utilities Commission (CPUC). 2017. *Decision 17-09-025. Decision Adopting Energy Efficiency Goals for 2018-2030*. Issued October 2, 2017.

²⁸ California Public Utilities Commission (CPUC). 2018. *Resolution D-4818*. Attachment A-45. Issued October 11, 2018.

²⁹ Home Energy Reports Work Paper. (Pacific Gas and Electric Company). 2019. Statewide Measure ID SWWB004-01. Submitted November 2019.

³⁰ In other aspects, UAT and HER are fundamentally different: UAT is an opt-in design in which customers elect to engage, while HER is an opt-out design whereby customers are randomly-assigned to either receive reports (treatment group) or not (control group) without electing to participate (opt-out design). UAT is an online audit tool typically engaged by an individual, and HER's printed reports can be viewed by all members of a household.

³¹ Violette, D. and P. Rathbun. 2017. Chapter 21: Estimating Net Savings: Common Practices: *Methods for Determining Energy Efficiency Savings for Specific Measures*. Golden (CO): National Renewable Energy Laboratory. NREL/SR-7A40-68578.

Stewart, J. and A. Todd. 2015. Chapter 17: Residential Behavior Protocol: The Uniform Methods Project: *Methods for Determining Energy Efficiency Savings for Specific Measures*. Golden (CO): National Renewable Energy Laboratory. NREL/SF-7A40-62497.

³² California Public Utilities Commission (CPUC). 2018. Resolution E-4952. October 11. P. A-45.

When comparison group change is netted out of the participant change, the netting will control for some, but not all, of the naturally-occurring measure implementation, leaving an unknown amount of free-ridership in the final savings estimate. The resulting estimate is thus somewhere in between net and gross savings.³³ Therefore, the NTG for quasi-experimental design methodology to be employed for the UAT measure should be between that used for residential NMEC (0.85) and that used for RCT (1.0). To err on the conservative side, we select the NTG value provided for residential NMEC, while acknowledging that there is a distinction between programs that use meter data to calculate savings and NMEC programs as conceived by Commission Staff that employ a pay-for-performance model as a build-in continuous improvement mechanism.

Net-to-Gross Ratios

NTG_ID		Source
<i>RCT-Default</i>	0.85	DEER2020

GROSS SAVINGS INSTALLATION ADJUSTMENT (GSIA)

The gross savings installation adjustment (GSIA) rate represents the ratio of the number of verified installations of the measure to the number of claimed installations reported by the utility. Because the UAT is an interactive online tool, each customer engagement with the tool is equivalent to a verified installation. Therefore, the GSIA of UAT is 1.0.

Gross Savings Installation Rate

Parameter	UAT	Source
GSIA	1.0	n/a

NON-ENERGY IMPACTS

Non-energy impacts for this measure have not been quantified.

DEER DIFFERENCES ANALYSIS

This section provides a summary of DEER-based inputs and methods, and the rationale for inputs and methods that are not DEER-based.

³³ Chapter 8: Whole-Building Retrofit with Consumption Data Analysis Evaluation Protocol. (Agnew and Goldberg). The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures. National Renewable Energy Laboratory. 2017. Page 11.

DEER Difference Summary

DEER Item	Comment / Used for Workpaper
Modified DEER methodology	No
Scaled DEER measure	No
DEER Base Case	No
DEER Measure Case	No
DEER Building Types	No
DEER Operating Hours	No
DEER eQUEST Prototypes	No
DEER Version	DEER 2019, READI v2.5.1
Reason for Deviation from DEER	DEER does not contain this measure
DEER Measure IDs Used	n/a
NTG	NTG ID: The NTG value of 0.85 is associated with NTG ID: <i>RCT-Default</i>
GSIA	GSIA ID: The GSIA value of 1.0 is associated with GSIA ID: <i>Def-GSIA</i>
EUL/RUL	EUL ID: The EUL value of 1 year for behavior programs does not have an associated EUL ID.

REVISION HISTORY**Measure Characterization Revision History**

Revision Number	Date	Primary Author, Title, Organization	Revision Summary and Rationale for Revision
1.0	November 22, 2019	Brian A. Smith, Analyst, PG&E	
1.0	December 13, 2019	Brian A. Smith, Analyst, PG&E	Addressing comments received by ex-ante team on December 10, 2019.
1.0	December 19, 2019	Brian A. Smith, Analyst, PG&E	Addressing comments received by ex-ante team on December 17, 2019. Additional details incorporated into savings reporting and load shape sub-sections, and in the definition of UAT participation.