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MCE Impact Evaluation Final Report

Program Year 2021

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1. Executive Summary

In Decision (D.) 12-11-015 issued in November 2012, the California Public Utilities Commission (CPUC) CPUC approved Marin Clean Energy (MCE), California's first Community Choice Aggregator (CCA), to administer ratepayer-funded Energy Efficiency (EE) programs alongside the Investor-Owned Utilities (IOUs) and Regional Energy Networks (RENs).[1]

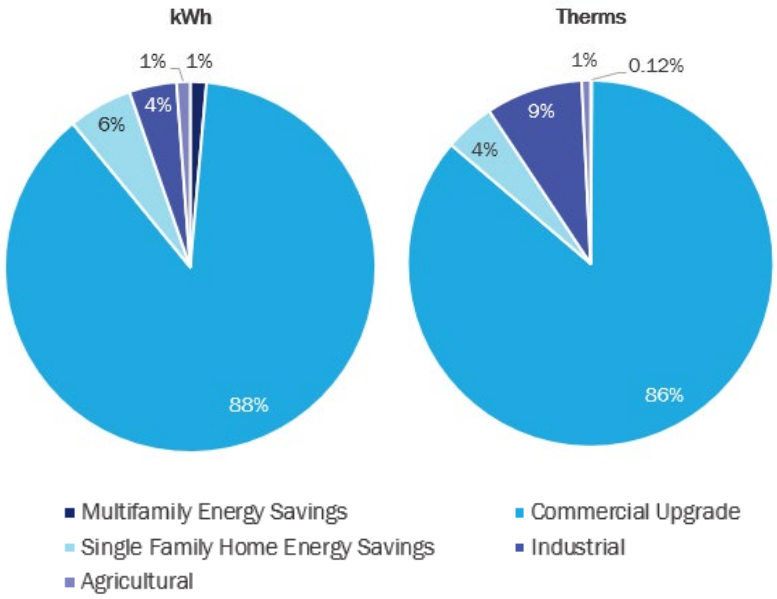
MCE's approved EE program budget for 2018–2025 is $85.7 million, more than a sevenfold increase from its last approved budget of $1.6 million annually. MCE expanded its core programs—Residential and Commercial—and added three new sectors: Agriculture, Industrial, and Workforce Education and Training (WE&T). Additionally, in January 2021, MCE requested another $4 million to support the launch of the Commercial Efficiency Market (CEM) program.[2] CEM is a Normalized Metered Energy Consumption[3] (NMEC) program that pays aggregators[4] a variable rate based on the time during which participants save electricity. The CEM program did not begin enrolling projects until the middle of 2021, and the program requires a year's worth of energy usage data after project installation to calculate energy savings. Therefore, the earliest MCE could claim savings from this program was in mid-2022.

Because MCE was the first CCA approved to administer ratepayer-funded EE programs, and given MCE's substantial budget increase, the CPUC expressed interest in an early assessment of the savings associated with MCE's resource programs. The CPUC wanted to understand how well MCE's program design works and ascertain how much influence MCE has on its customers to carry out EE projects. As such, the evaluation team reviewed the gross[5] electric and therm savings that MCE claimed[6] in PY2021. As shown in Figure 1, MCE's Commercial Upgrade program was responsible for 88% of its claimed kWh and 86% of its therm savings. The Single-Family Direct Install (SFDI) and Multifamily Direct Install programs together contributed 7% to MCE's claimed kWh savings and 5% to its claimed therm savings. The Agriculture and Industrial programs contributed even smaller shares. These percentages guided the decision to conduct a comprehensive gross impact evaluation of MCE's Commercial Upgrade program and a desk review of the claimed gross savings from its SFDI and Multifamily programs. The team conducted surveys to develop Net-to-Gross Ratios[7] (NTGRs) for the Commercial Upgrade, SFDI and Multifamily programs but was only able to estimate NTGRs for the first two

[1] The four Investor-Owned Utilities (IOUs) are Pacific Gas & Electric Company (PG&E), Southern California Edison Company (SCE), San Diego Gas & Electric Company (SDG&E), and Southern California Gas Company (SCG). The Regional Energy Networks (RENs) that actively offer energy efficiency programs include Southern California Regional Energy Network (SoCalREN), the Bay Area Regional Energy Network (BayREN), and Tri-County Regional Energy Network (3C-REN).
[2] Beginning in 2022, the CEM program began operating as an independent program.
[3] NMEC is a method used to measure gross energy savings using metered energy consumption data to compare baseline and reporting period consumption under normal operating conditions. Normalization of energy consumption is achieved using adjustment models that account for routine events, and other adjustments to account for non-routine events so that consumption in baseline and reporting periods can be directly compared, as if all relevant variables were the same in the two periods. Normalized baseline period and/or reporting period energy consumption are calculated using one or more adjustment models.
[4] Aggregators in this program are organizations that recruit customers and install projects, many aggregators in this program are also known as program implementation firms.
[5] Gross savings measure changes in energy consumption that result directly from program-related actions taken by participants of an energy efficiency program, regardless of why they participated.
[6] Claims, or claimed savings, are expected energy and demand savings associated with program equipment submitted by each PA on a quarterly basis
[7] NTGRs lead to net savings, which are changes in energy use that are attributable to a particular energy efficiency program and take into consideration savings from participants who would not have purchased energy efficient technologies without the influence of the program. Savings attributable to participants who would have purchased energy efficient technologies with or without the program influence are excluded from net savings. These participants who were not influenced by the program are considered free-riders.

programs.[8] Participation in the Multifamily program was limited to four customers, and we only completed an NTG survey with one of them; we therefore did not have sufficient data to develop a NTGR for the Multifamily program.

Figure 1. MCE PY2021 Energy Efficiency Portfolio Claimed Gross kWh and Therm Savings



The CPUC also wanted to learn about the program design, implementation, and influence of the new CEM program. MCE describes this program as one that helps to reduce barriers to entry by allowing aggregators to enroll EE projects that are not confined to the installation of energy saving technologies from a list. Instead, qualified aggregators participate in the program by enrolling customer projects based on their energy needs, technology fit, and cost. MCE's original intent was to pay aggregators 12 months after a project is enrolled based on energy savings shown at the meter, but the 2022 MCE CEM Implementation Plan states that, "aggregators are able to receive payments quarterly for value delivered at the portfolio level."[9] To better understand this program, the evaluation team reviewed program materials, project documentation and customer data, and conducted interviews with MCE program staff, the implementer (Recurve), aggregators, and customers.

The remainder of this Executive Summary presents the results, findings, and recommendations based on program year (PY) 2021 data for each of the MCE programs we examined.

Commercial Efficiency Marketplace

CEM is a path for commercial aggregators to use performance-based incentives[10] to maximize and optimize energy savings for their customers. To qualify, customers may install any type of equipment and incentive payments are tied to the energy-saving performance of the building measured by the meter. This program

[8] A program NTGR expresses the savings attributable to a program divided by the claimed savings of a program. Alternatively, the ratio expresses the share of a program's savings that resulted due to its existence.
[9] MCE Commercial Efficiency Marketplace 2022 Program Implementation Plan (version 9), pp. 21.
[10] Performance-based incentives are incentives given based on the amount of energy a building uses after installing EE equipment as compared to the amount of energy a building used before installing the equipment. Typically, the performance is calculated one year after EE equipment is installed and compared to the 12 months prior.

began in May 2021 and because claimed savings rely on NMEC methods, final savings for this program could not be claimed in 2021. Though we did not evaluate the savings because our evaluation covered PY2021, we did assess the program design, the first phases of program implementation, and the influence this program has had on aggregators and their customers who enrolled in the program. Additionally, we assessed the reasonableness of the forecasted savings by comparing the overall project level claimed savings values to Customer Information System (CIS) billing data.

Findings

Main findings about the CEM program include the following:

- Program Design: CEM is a path for commercial aggregators to maximize and optimize energy savings for projects with performance-based incentives; it is a population NMEC program with no fixed equipment or incentives. All incentive payments are tied to the delivery of savings at the meter-level after installation. MCE pays aggregators at the conclusion of each year based on the savings achieved.
- Participation: The CEM program launched in May 2021. In 2021, 26 total projects were initiated under the CEM program. These projects entailed either lighting (17/26) or equipment (9/26). Just over half of the projects occurred in grocery stores (14/26) and 35% took place at retail stores (9/26). The remaining few took place in office buildings and at a lodging site.
- Forecasted Incentives: In the 2021 program budget, $931,750 was ear-marked for incentives payments (72% of the annual program budget).[11] These incentive dollars were allocated to aggregators who enrolled a forecasted net[12] savings of 3.3 GWh. As of the end of 2021, MCE had not yet paid any incentives to aggregators as they were waiting for a full year of post-project performance savings to pay aggregators on actual savings. However, we found that MCE has changed this policy and now allows aggregators to receive payments quarterly for value delivered at the portfolio level.[13]
- Program Influence on Aggregators: Given the program was in the early stages of implementation at the time of our evaluation, there were no claimed savings in 2021. However, we interviewed two of the aggregators who participated in 2021 and were responsible for enrolling projects that equaled approximately 85% of the total forecasted savings for all projects enrolled in PY2021. We spoke to these aggregators to explore if and how the program influenced the projects so far. The two aggregators said the program prompted them to expand both their customer base and their project scopes per customer.
- Program Influence on Customers: We interviewed two customers—one who upgraded VFD fans for HVAC equipment in nine locations and another who upgraded lighting in 14 of its locations. One customer said he had planned to upgrade the VFDs prior to the aggregator getting involved, while the other said that the aggregator came to him with lighting project ideas. Both customers noted they were seeking the best return on investment, and the aggregator was able to provide this. In both cases, the aggregator provided the customers with a flat incentive amount. When asked if the customers would have carried out the projects without the assistance of the aggregator, one noted that he would while the other said he would not.

[11] MCE Commercial Efficiency Marketplace 2021 Program Implementation Plan.
[12] Net savings are changes in energy use that are attributable to a particular energy efficiency program and take into consideration savings from participants who would not have purchased energy efficient technologies without the influence of the program. Savings attributable to participants who would have purchased energy efficient technologies with or without the program influence are excluded from net savings. These participants who were not influenced by the program are considered free-riders.
[13] Page 21 of the MCE Commercial Efficiency Marketplace 2022 Program Implementation Plan (version 9) notes that "aggregators are able to receive payments quarterly for value delivered at the portfolio level."

- Lessons learned regarding implementation: A summary of the key lessons learned so far about include:
  - A new program concept takes time to launch.
  - Time and hearing about success that early enrollees (aggregators and customers) are having in the program is helping aggregators overcome uncertainty around the program design, specifically the risk involved in waiting to receive incentive payments based on post-project performance shown at the meter.
  - Enrollment requirements can be a barrier to customer participation. For example, one customer was unaware that he was not supposed to install major new load additions or subtractions, solar panels, or electric vehicle charging in the year after installing the CEM rebated project. He said he would not have agreed to carry out the CEM rebated project if he was limited in the future projects he could carry out in the year.
  - Aggregators need assistance with forecasting savings, which Recurve offers when they enroll to participate in the CEM program. According to one aggregator, Recurve operates a portal that allows aggregators to enter customer data associated with their operations and the EE project and generate a forecast of energy savings.
  - Careful attention must be given to the meter ID numbers associated with projects to ensure proper aggregation of consumption data to the site at which an aggregator enrolled a customer's EE project in the CEM program.

Recommendations

Based on our early look at the CEM program, we make a few recommendations to help streamline program implementation and ensure MCE gathers the appropriate information from aggregators and customers to facilitate evaluation, should the CPUC elect to do so.

- Ensure aggregators carefully communicate the participation requirements to customers when enrolling their projects, particularly the requirement that the customer make no major changes for the 12 months following the EE project. One customer who is charged with energy management of a chain of grocery stores said he would not have agreed to carry out the CEM rebated project if he was limited in the future projects he could carry out during the post-installation period.
- While the CEM Measurement and Verification (M&V) plan generally aligns with the NMEC Rulebook, we recommend MCE pays careful attention to the similarity of projects enrolled in the program. As stated in the NMEC Rulebook, "Population-level NMEC program sites must have building-type similarity such that…energy savings from program interventions will be similar across all sites in the population."[14]
- Ensure careful review of the Electronic Technical Reference Manual (eTRM) and hours of operation data when calculating claimed savings. We found a few issues with the claimed savings estimates. It is possible that the hours of operation may be slightly overstated for some grocery stores that claim all lighting is illuminated 24/7, but do not operate 24/7. Further, two VFD claims did not match with the eTRM and there was not enough documentation to explain why.
- Based on our evaluability assessment, we found MCE provided a single meter ID number for each project site. If more than one meter ID is affected by a project at a given site, we recommend MCE

[14] Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption, Version 2.0, Release Date: 7 January 2020. Pp. 12. https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/n/6442463694-nmec-rulebook2-0.pdf

include all meter IDs that are affected by the retrofit. If only one meter was affected, it would be useful to note this information in the program tracking data. Providing a full set of meter IDs associated with the site, if applicable, will reduce the likelihood of improperly aggregating consumption data to the site level.

Commercial Upgrade Lighting Program

This evaluation focused on three types of Light Emitting Diode (LED) equipment that MCE rebated through the Commercial Upgrade program:

- Custom[15] LED lighting in interior applications (Custom Interior)
- Custom LED lighting in exterior applications (Custom Exterior)
- Deemed[16] Tubular LED (TLED) lighting (Deemed)

These three LEDs rebated in PY2021 represent roughly 83% of the total megawatt hour (MWh) energy savings claimed by the program, over the life of the lighting equipment – referred to as lifecycle savings.[17] Table 1 presents the distribution of claimed energy and demand savings by each of the lighting equipment types. In compliance with CPUC D.11-07-030 gross savings claimed by MCE for all custom equipment incorporate a gross realization rate[18] (GRR) of 0.9.[19] The second set of savings presented in the table show "engineering numbers", which are the savings without the 0.9 realization rate. D.11-07-030 does not apply to deemed equipment, so for these the two sets of savings are identical.

Table 1. PY2021 Claimed Lifecycle Gross Savings for Lighting Equipment

2021 Lighting	Lifecycle Gross Savings Claimed		Engineering Lifecycle Gross Savings (no 0.9 GRR)	
	MWh	MW	MWh	MW
Custom Interior	9.353	1.1	10,393	1.2
Custom Exterior	11,194	0.1	12,438	0.1
Deemed	205	0.0	205	0.0

The primary objective of this study was to review program savings claims for the three types of lighting equipment, and to conduct research that develops revised estimates of savings. This portion of the evaluation focused on the key parameters that make up the energy savings (in MWh) and demand savings (in MW) achieved over the lifetime of the lighting:

- Installation type—accelerated replacement (AR) versus normal replacement (NR).
- Installed equipment counts—the number of rebated units that were installed and operable.

[15] Custom equipment refers to when the energy savings for equipment is custom-calculated based on a building's unique characteristics such as square footage, occupancy levels and hours of use.
[16] Deemed equipment refers to when the energy savings for equipment is calculated based on the average amount of energy savings found in the marketplace and those average values are typically housed in a centralized database for programs to use for claimed savings.
[17] This excludes on large NMEC site that was installed at the end of PY2021 that accounted for nearly half of MCE's claim. This site was not in the original population frame when the work plan was developed.
[18] A gross savings realization rate often refers to the fraction of savings that is typically found in a building for a given piece of equipment. It may account for the average amount of equipment that is typically uninstalled or broken, or the variation seen in building and equipment characteristics between program records and on-site verification.
[19] D.11-07-030 p38 OP6: https://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/139858.pdf

- Annual hours of use (HOU).
- Effective useful life (EUL)—the number of years that the EE equipment will operate into the future, which is critical to estimating lifecycle savings.

We relied on telephone surveys to collect the information necessary to study each parameter. We attempted calls with all customers who installed the 80 lighting projects, with the objective of estimating these parameters at the highest possible level of statistical precision. We completed 40 telephone surveys, producing a precision rate of 9% at the 90/10 confidence interval. In the gross analysis of customer responses, we also made use of lighting operation data collected on-site in previous evaluations at similar customer sites.[20] We compared claimed program savings to the evaluated savings which we refer to as the realization rate, or the ratio of the evaluated savings to claimed savings.

The study also examined how successful the lighting component of MCE's Commercial Upgrade program was at influencing customers to install EE technologies. We refer to customers who would have installed the same EE equipment in the absence of the program as free riders because they receive incentives for actions they would have undertaken without the program's existence. The telephone surveys asked several questions regarding the program's influence on their decision to install the EE equipment. To estimate the NTGR we analyzed answers from the 40 completed surveys and examined various factors including what the customer would likely have done in the absence of the program. The NTGR is a value between zero and 1.0. The higher the ratio the better, meaning the program had a higher influence on the installation of that energy efficient technology.

Results

Table 2 presents the NTGR estimated for lighting rebated under MCE's PY2021 Commercial Upgrade program.[21]

Table 2. Claimed and Evaluated NTGRs for PY2021 Commercial Upgrade Lighting

2021 Lighting	NTGR	
	Claimed	Evaluated
Custom Interior	0.96	0.73
Custom Exterior	0.96	
Deemed	0.65	

Most of the 80 projects installed a combination of lighting equipment, and program influence was not evaluated at the equipment-specific level, so the evaluated net result applies to all lighting at the site. Overall, the evaluated NTGR is lower than the claimed default for custom equipment and higher for deemed equipment.

Table 3 presents the net lifecycle savings results of this evaluation. For each lighting equipment type, we show the claimed and evaluated net lifecycle savings values (MWh). The net realization rates (NRRs) are the ratio between evaluated and claimed savings. For custom interior and custom exterior lighting, the NRR was 34%. Deemed lighting realized 51% of the net claimed savings.

[20] The methodology is extensively explained in "Final Impact Evaluation, Nonresidential Lighting Sector Program, Program Year 2020" completed for the CPUC on CALMAC.org

[21] The evaluated NTGR includes a market effects adder of 0.05. See footnote 3 for additional details.

Table 3. Net Lifecycle MWh Savings for Evaluated PY2021 Commercial Upgrade Lighting

2021 Lighting	Lifecycle Net MWh Savings		
	Claimed	Evaluated	Realization Rate
Custom Interior	8,979	3,020	34%
Custom Exterior	10,746	3,621	34%
Deemed	133	68	51%

In general, the NRRs were driven down by a combination of lower HOU of lighting equipment, inaccurate lifecycle savings parameters, and the lower NTGR relative to the guideline NTGR for custom lighting.

Findings

Below are key findings from this study. These results are based on the 40 participant telephone surveys we conducted and our desk review of program tracking data and project documentation.

Installations

- Nearly all customers confirmed that they installed the lighting equipment and quantities claimed in the program tracking data. We verified that the quantities claimed match those used in the Modified Lighting Calculator (MLC), a tool that uses Database for Energy Efficient Resources (DEER) values as inputs to savings calculations. We only found one data entry error in one MLC, which we corrected in the evaluated results.
- MCE claimed all lighting projects were Accelerated Replacement (AR) projects, meaning the customer installed the LEDs while their old lights were still viable. Based on survey responses, six participants indicated that their old lights were failing; or that they were actively planning a lighting upgrade and would have done the same lighting upgrade in the absence of the program. We re-classified these six as Normal Replacement (NR) projects. NR projects have lower energy savings because they are calculated from industry standard practice efficiency levels, rather than from the efficiency levels of the replaced equipment.

Operating Hours and Equipment Life

- Overall, we found lower operating hours than the DEER estimates that automatically populated in the Modified Lighting Calculator (MLC) based on facility type and location. Lower operating hours lead to lower energy savings.
- The guidance, based on DEER, for calculating the EUL for custom LED equipment is to use the maximum of 12 years, or 50,000 hours rated life divided by the annual HOU. All custom projects claimed 12-year EULs. The evaluation found two sites for which the HOU exceeded 4,166 hours. The evaluated EULs for these two sites were less than 12 years.
- For AR equipment, the guidance for calculating the remaining useful life of the equipment removed is one-third of the life of the original equipment.[22] As documented in the MLC calculators, all lighting equipment removed had 15 years rated life. Their remaining life is therefore 5 years, not 4 years, as claimed in the program tracking data. Higher remaining useful life (RUL) values lead to increased energy savings.

[22] CPUC "Statewide Custom Project Guidance Document" v 1.4, 2021, p11. https://file.ac/OEr-2p-bk3A/

- The deemed equipment claimed by the program are all TLED lamps, which are LED lamps that can function with an electronic ballast from the existing T8 fluorescent fixtures. Workpaper SWLG009-02 which was in effect in 2021, stipulates a 5-year remaining life and a 5 year total life for the TLED equipment.[23] The program claimed a total equipment life of 15 years and a remaining life of 5 years for the deemed TLED equipment, which significantly overstates lifecycle savings.

Savings Estimates

- For AR equipment there are two sets of relevant annual savings.
  - First baseline savings: the savings achieved by replacing the existing equipment with the new LED. These annual savings are achieved over the number of years in which the removed equipment would have still been viable, and account for the "acceleration" of their replacement under program influence (5 years for most installations.)
  - Second baseline savings: at the end of the period in which the old equipment would still have been viable (5 years), new lighting becomes necessary. LEDs are currently "standard practice", so the program can continue to claim energy savings for additional years only if the rebated LEDs continue to be more efficient than the lowest efficiency ("standard practice") lighting equipment available on the market.
- For custom lighting equipment, second baseline savings vary based on each individual equipment installed and are significantly lower than first baseline savings. Unfortunately, in PY2021, the program claimed second baseline savings as a constant fraction of 81.9 percent of first baseline savings, which significantly overstates annual savings for the remaining 7 years of the LED equipment.
- For deemed equipment second baseline savings are equal to zero, because the old electronic ballast is no longer viable once the initial 5 years have elapsed; if the entire fixture is replaced, the TLEDs are discarded even if they are still functional. Unfortunately, in PY2021, the program claimed second baseline savings for deemed TLEDs as a constant fraction of 60 percent of first baseline savings, thus continuing to claim savings for 7 years beyond the equipment life stipulated in Workpaper SWLG009-02.

Program Influence

- For the most part, we found that the program was fairly influential in the customers' decision to install LED lighting. Overall, the evaluated NTGR was 0.73.[24] This is significantly lower than the claimed NTG value of 0.96 for custom lighting, but somewhat higher than the value of 0.65 for the deemed lighting.

Recommendations

Based on the evaluation and conclusions above, we present the following recommendations to MCE for the Commercial Upgrade program.

- Installations: Probe AR conditions as claimed by the implementers prior to claiming savings. Projects where equipment has reached the end of its useful life, or where the customer was planning a lighting project in the very near future, should not be claimed as "early replacement."

[23] To access this workpaper and others, visit http://deeresources.net/workpapers. To find the SWLG009-02 Workpaper, perform a search for LED Tube Type A in the listed Workpapers section of the site.
[24] This includes the 0.05 market effects adder.

- Savings Calculations: Rely on the MLC for the correct second baseline savings for all custom equipment. Using a flat 81.9 percent of the first baseline savings caused MCE to significantly overstate gross lifecycle savings.
- Use the correct RUL for custom equipment. Using a RUL of 4 instead of the correct 5 years caused the lifecycle calculation to underestimate lifecycle savings for the RUL of the equipment removed.
- Use the correct EUL/RUL and second baseline for deemed equipment. Type A TLED installations are governed by Workpaper SWLG009-02. Failure to follow the Workpaper guidelines caused MCE to significantly overstate gross lifecycle savings.
- The results of this evaluation, which found operating hours and peak coincidence factors lower than the current DEER estimates, should be considered for future updates to the DEER lighting hours and the Modified Lighting Calculator (MLC) which incorporates the DEER values.

These issues continue in PY2022 as we have thus far observed in the program tracking data for the program. We advise MCE to adjust the parameters and savings for deemed and custom lighting equipment before the PY2022 claims become final in May 2023.

Single-Family and Multifamily

The evaluation team focused on two residential programs offered by MCE: Single-Family Direct Install (SFDI) and Multifamily. These programs jointly contributed 7% of claimed lifecycle gross energy savings and less than 5% of lifecycle gross therm savings from projects completed in PY2021 (see Figure 1). Because the SFDI and Multifamily programs contribute relatively small shares to MCE's PY2021 portfolio savings, the evaluation team and CPUC agreed to a desk review of gross savings claims rather than higher rigor impact methods similar to the Commercial Upgrade program. The next section summarizes our recommendations for MCE's residential programs.

Recommendations

- Based on our review of MCE's 2021 claims for deemed SFDI and Multifamily equipment, it appears that some of the eTRM data may need to be updated to reflect the latest approved eTRM workpaper/equipment packages. It also appears that there is a need for additional permutations in the eTRM to cover real-world scenarios, such as the 'hard to reach' (HTR) and 'Energy Upgrade California' (EUC) NTG_IDs. Those issues aside, it does appear that MCE is likely claiming some incorrect parameter values such as unit energy savings (UES) and gross savings installation adjustment (GSIA). Please see Appendix D for additional recommendations.
- Monitor 2022 MCE claims to verify whether the new 'MeasDetailID' field alleviates some of the matching issues. For those issues which still exist, MCE should work with the eTRM team to ensure that the appropriate values exist in the eTRM.
- Based on our NTG analysis, we recommend MCE apply the evaluated NTGR to its claim corrected first year gross energy and demand savings for a more accurate representation of its SFDI program savings.

2. Introduction

In Decision (D.) 12-11-015 issued in November 2012, the CPUC provided guidance on the role for MCE, California's first CCA. With this decision, the CPUC approved MCE to administer ratepayer-funded energy efficiency (EE) programs alongside IOUs and RENs.[25]

MCE's approved EE program budget for 2018–2025 is $85.7 million, more than a sevenfold increase from its last approved budget of $1.6 million annually. MCE expanded its core programs—Residential and Commercial—and added three new sectors: Agriculture, Industrial, and WE&T. Additionally, in January 2021, MCE requested a further $4 million to support the launch of the CEM program, which initially began as a subprogram of its Commercial Upgrade program.[26] CEM is an NMEC program that pays aggregators a variable rate based on the time during which participants save electricity. The CEM program did not begin enrolling projects until the middle of 2021, and the program requires a year's worth of energy usage data after project installation for measuring savings. So, the earliest MCE could claim savings from this program was in mid-2022.

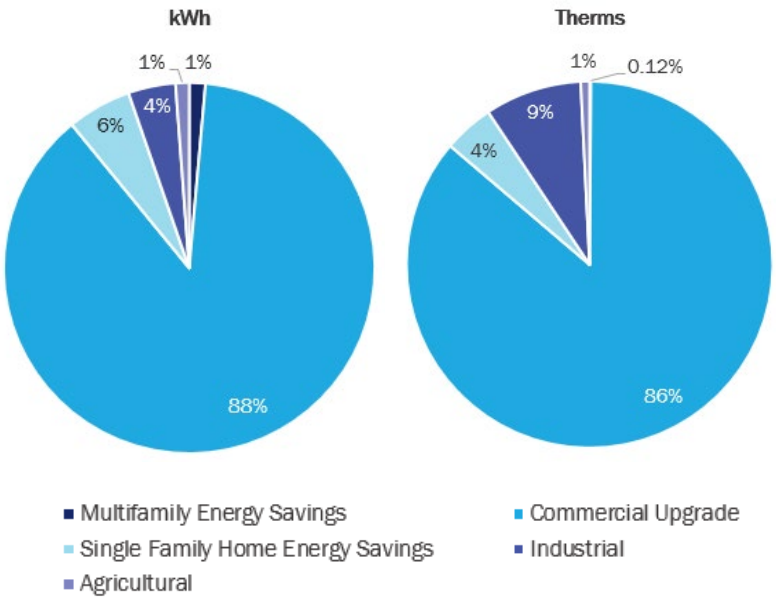
Because MCE was the first and longest-running CCA approved to administer ratepayer-funded EE programs, and given MCE's substantial budget increase, the CPUC expressed interest in evaluating the impacts of MCE's resource programs. The CPUC wanted to understand how well MCE's program design works and ascertain how much influence MCE has on its customers to carry out EE projects. As such, the evaluation team reviewed the lifecycle gross electric and therm savings that MCE claimed in PY2021 to determine the programs on which to focus this study. As shown in Figure 2, MCE's Commercial Upgrade program was responsible for 88% of its claimed lifecycle gross kWh and 86% of its claimed lifecycle gross therm savings. The SFDI and Multifamily programs together contributed 7% to MCE's claimed lifecycle gross kWh savings and 5% to its claimed lifecycle gross therm savings. The Agriculture and Industrial programs contributed even smaller shares. These percentages guided the evaluation team's decision to conduct a comprehensive gross and net impact evaluation of MCE's Commercial Upgrade program and an ex ante review of the first year gross savings from its SFDI and Multifamily programs. The team conducted surveys to develop NTGRs for the SFDI and Multifamily programs but was only able to estimate an NTGR for the SFDI Program.[27] Participation in the Multifamily program was limited to four customers, and we only completed an NTG survey with one.

[25] The four IOUs are PG&E, SCE, SDG&E, and SCG. The RENs that actively offer energy efficiency programs include SoCalREN, BayREN, and 3C-REN.

[26] Beginning in 2022, the CEM program began operating as an independent program.

[27] A program NTGR expresses the savings attributable to a program divided by the claimed savings of a program. Alternatively, the ratio expresses the share of a program's savings that resulted due to its existence. Typically, a NTG ratio is equal to 1 –FR + spillover, where FR represents the energy savings from free riders, that is savings that would have resulted even if a program did not exist. Spillover is the additional energy savings that arise outside of those from a program but due to its influence. In this report, we do not estimate spillover and therefore we assume the NTGR is equal to 1 – FR. Where noted, we do include a 0.05 market effects adder in place of estimating spillover.

Figure 2. MCE PY2021 Energy Efficiency Portfolio Lifecycle Gross kWh and Therm Savings



The CPUC also wanted to learn about the program design, implementation, and influence of the CEM program, as it was one of the first NMEC programs in the state. MCE describes this program as one that helps to reduce barriers to entry by allowing aggregators to enroll EE projects that are not confined to the installation of measures from a list. Instead, qualified aggregators participate in the program by enrolling customer projects based on their energy needs, technology fit, and cost. MCE pays out incentives 12 months after a project is enrolled based on energy savings shown at the meter. To better understand this program, the evaluation team reviewed program materials, project documentation and customer data, and conducted interviews with MCE program staff, the implementer (Recurve), and program participants.

The remainder of this report is organized as follows:

- Section 3 presents the early examination of the CEM program, including a review of the program design, implementation, participation, influence of the program on aggregators and their customers, and lessons learned from our examination. It provides a program description, describes our research objectives, and presents findings from our early examination of the CEM program.
- Section 4 describes the gross and net evaluation of the lighting component of the Commercial Upgrade program (also referred to in this report as the Commercial Upgrade Lighting program, for simplicity). Estimation of the gross and net impacts relied on scrutiny of MCE's program tracking data and review of primary data collected through the implementation of a survey to PY2021 lighting customers who participated in the Commercial Upgrade program.
- Section 5 presents the ex ante review of the SFDI and Multifamily programs, as well as the development of the NTGR for the SFDI program and our attempt at estimating an NTGR for the Multifamily program. The development of the SFDI NTGR was based on data collected through an NTG survey we implemented to PY2021 SFDI program participants.

Sections 4 and 5 introduce the programs, describes the data sources and methods of research, and presents the results, findings and recommendations to improve alignment of the claimed energy savings to evaluated savings.

3. Commercial Efficiency Marketplace

As part of an impact evaluation of MCE's 2021 EE portfolio of programs, we evaluated the beginning stages of MCE's CEM program. Given the recent $4 million in additional budget to support the program and recent action the CPUC has taken to help ensure continued electricity reliability for Summer 2023 (see Rulemaking 20-11-003), ED indicated an interest in understanding the program design, the pipeline of projects enrolled, the lessons learned from implementation so far, and the reasonableness of forecasted savings.

This section of the report describes the findings after reviewing program materials and data and interviewing implementation staff across MCE and Recurve. We also interviewed the aggregators who signed up for the program and spoke to customers who had their EE projects enrolled into the CEM program. Specifically, we interviewed two program staff from MCE, a Director with Recurve, two of the three aggregators that submitted projects in 2021, and two of five unique customers that enrolled 23 out of the 26 projects in 2021.

3.1 Summary of Findings

Below is a summary of the key findings presented in this section. The remainder of this section provides more detail in each of these areas:

- Program Design: CEM is a path for commercial aggregators to maximize and optimize energy savings for projects with performance-based incentives; it is a population NMEC program with no fixed measures or incentives. All incentive payments are tied to the delivery of savings at the meter-level within 12 months of projects. MCE pays aggregators at the conclusion of each year based on the savings achieved.
- Participation: The CEM program launched in May 2021. In 2021, 26 total projects were initiated under the CEM program. These projects mostly entail lighting (17/26) and some installed variable frequency drives (VFDs) for HVAC equipment. Just over half of the projects occurred in grocery stores (14/26) and several retail stores also completed projects (9/26). All of these were single measure projects where customers only received lighting or VFD upgrades. According to MCE staff, further projects in the pipeline involve multiple measure projects, refrigeration, and some fuel-substitution.
- Forecasted Incentives and Net Electric Savings: In the 2021 program budget, $931,750 was ear-marked for incentives payments (72% of the annual program budget).[28] These incentive dollars were allocated to aggregators who enrolled a forecasted net savings of 3.3 GWh. As of the end of 2021, MCE had not yet paid any incentives to aggregators as they were waiting for a full year of post-project performance savings to pay aggregators on actual savings. We found that MCE has changed this policy and now allows aggregators to receive payments quarterly for value delivered at the portfolio level.[29]
- Program Influence on Aggregators: Given the program was in the early stages of implementation at the time of our evaluation, there were no claimed savings in 2021. However, we interviewed two of the aggregators who participated in 2021 and were responsible for enrolling projects that equaled approximately 85% of the total forecasted savings for all projects enrolled in PY2021. We spoke to these aggregators to explore if and how the program influenced the projects so far. The two aggregators said the program did indeed lead them to expand their ability to get more customers and that the scopes of the projects were larger than they would have been under another program. They rated program influence quite high, with scores of 8 or 10 across several program factors. Interviews

[28] MCE Commercial Efficiency Marketplace 2021 Program Implementation Plan.
[29] Page 21 of the MCE Commercial Efficiency Marketplace 2022 Program Implementation Plan (version 9) notes that "aggregators are able to receive payments quarterly for value delivered at the portfolio level."

with program staff and aggregators revealed the following takeaways regarding how incentives help motivate aggregators:

- Aggregator interest was higher than expected and 17 enrolled by the end of 2021. Of these, three submitted a total of 26 projects.
- Aggregators need time to learn the program concept, watch it progress and build confidence.
- The incentive structure and flexibility around project eligibility are motivating aggregators. However, it is challenging to measure the influence of the incentives on customers because the incentive, which is dependent on the time and amount of energy savings, goes to the aggregator and is somewhat "hidden" from customers, (i.e., the incentive is incorporated into a discounted project price for the customer, which has to date, been offered as a flat incentive). but the customer may not be aware they received a discounted price.

- Program Influence on Customers: We interviewed two customers—one who upgraded VFDs for HVAC equipment in nine locations and another who upgraded lighting in 14 of its locations. One customer said he had planned to upgrade the VFDs prior to the aggregator getting involved, while the other said that the aggregator came to him with lighting project ideas. Both customers noted they were seeking the best return on investment, and the aggregator was able to provide that by offering them flat incentives. Neither customer was aware that the incentives received by the aggregator depended on the value of the electric savings achieved, but the size of the flat incentive enticed the customers to carry out their projects. When asked if the customers would have carried out the projects without the assistance of the aggregator, one noted that he would while the other said he would not.
- Comparison of the CEM Measurement and Verification (M&V) plan with the CPUC NMEC Rulebook: The evaluation team finds that the M&V plan is in alignment with NMEC Rulebook guidance except for in two key areas:
  - The NMEC Rulebook notes that "final savings claims must be normalized by long term weather based on the most up-to-date weather files (such as CALEE 2018). The evaluation team learned that MCE and Recurve rely on actual weather when calculating 2021 energy savings claims.[30] We do recognize that normalizing weather data (i.e., relying on "typical" weather data sets) is backward-looking and may not account for effects of climate change.
  - The NMEC Rulebook does not specify whether the use of a comparison group in addition to a net-to-gross ratio for developing net savings is appropriate. We recognize that methodologically there is no perfect approach to obtaining net savings with an opt-in program design with this population size. However, the M&V Plan notes that MCE will combine the traditional application of a NTGR with reliance on a comparison group adjustment to gross savings impacts. Combining methods could potentially double-count spillover and/or free ridership. We recommend no adjustments to the approach.
- Lessons learned regarding implementation: A summary of the key lessons learned so far about include:
  - A new program concept takes time to launch.

[30] Based on email correspondence between CPUC, Recurve staff, and the evaluation team, we learned that Recurve is using actual weather. Some of the reasons provided note that normal year weather is backwards looking and may not contemplate climate change, and the application of normal year weather can change lead to savings profiles that may not accurately represent the program. Email from Carmen Best, Vice President of Policy & Emerging Markets at Recurve, 1/30/2023.

  - Time and information are helping aggregators overcome uncertainty around the program design, specifically the risk involved in waiting to receive incentive payments based on 12 months of post-project performance.
  - Enrollment requirements can be a barrier to customer participation. For example, one customer was unaware that he was not supposed to install major new load additions or subtractions, solar panels, or electric vehicle charging in the year after installing the CEM rebated project. He said he would not have agreed to carry out the CEM rebated project if he was limited in the future projects he could carry out.
  - Aggregators need assistance with forecasting savings, which Recurve offers when they enroll to participate in the CEM program. According to one aggregator, Recurve operates a portal that allows aggregators to enter customer data associated with their operations and the EE project and generate a forecast of energy savings.
  - Aggregators can be motivated to participate by analyzing the performance of projects they have submitted to past programs.
  - Careful attention must be given to the meter ID numbers associated with projects to ensure proper aggregation of consumption data to the site at which an aggregator enrolled a customer's EE project in the CEM program.
  - Program design appeals to aggregators but attention is needed to simplify requirements and track project performance.
- Measure Level Savings: We found a few issues with the measure level ex ante savings estimates. It is possible that the hours of operation maybe be slightly overstated for some grocery stores that claim all lighting is illuminated 24/7, but do not operate 24/7. Further, two VFD claims did not match with the eTRM and there was not enough documentation to explain why.
- Project Level Savings: Overall, the electric consumption comparison analysis found the overall project-level ex ante savings values to be in a reasonable range, and in most cases matched well to the change in usage observed from the pre- to the post-installation period.
- Evaluability: MCE is collecting the necessary data to conduct an impact evaluation. MCE provided us with detailed information on EE equipment installed and removed; account IDs; meter IDs; EE equipment installation and project completion dates; site location; building type; and customer contact information. For each customer, one site ID was provided. While we can identify additional meter IDs with the information provided in the program tracking data, it would be useful if MCE could identify all meter IDs associated with a participating facility.

3.2 Research Objectives

This section summarizes the CEM program research objectives and questions explored in this section of the report. Our evaluation of the CEM program:

- Documented program design
- Compared the CEM M&V Plan to the NMEC Rulebook to ensure MCE and its implementer Recurve are adhering to Rulebook requirements.
- Analyzed pipeline data to explore what projects are in progress.
- Explored what MCE has to date for ex ante savings and project documentation for 2021 and identify any potential issues in the forecasts analysis for each measure and project that might impact savings.

- Performed an evaluability assessment to determine whether MCE has collected adequate information to conduct an impact evaluation in the future after MCE claims savings.
- Examined program influence and whether the CEM program helped motivate aggregators, and in turn their customers, to install EE equipment.

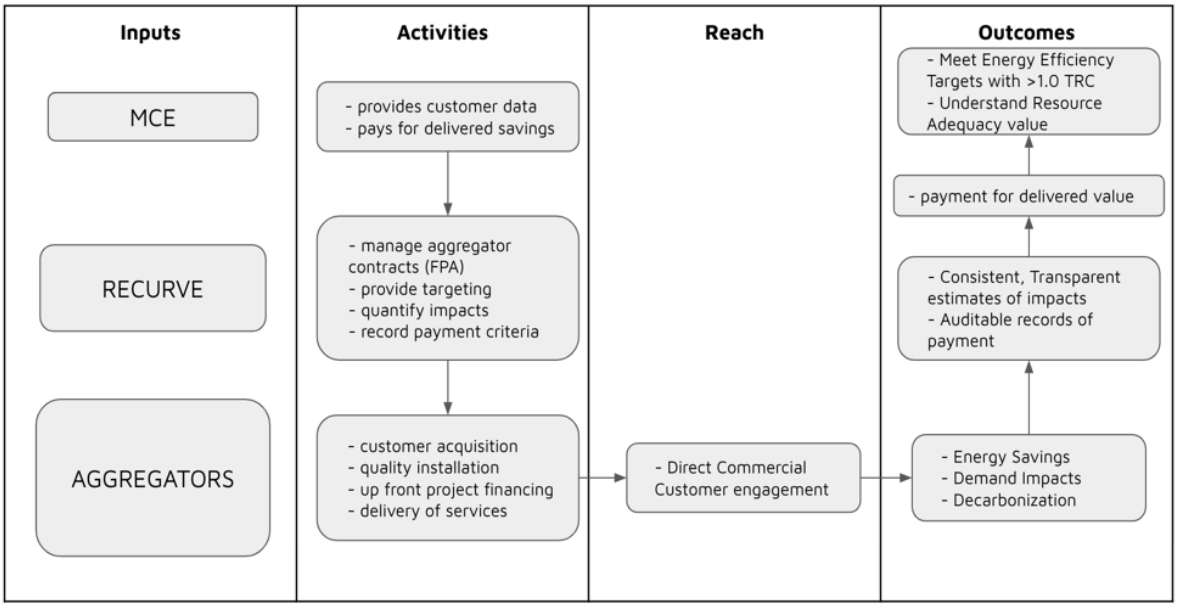
3.3 Detailed Findings

3.3.1 Program Design Overview

The CEM program launched in May 2021. It offers a path for commercial aggregators to maximize and optimize energy savings for projects with performance-based incentives; based off the Total System Benefit (TSB) generated by the projects, TSB is based off the avoided cost calculator and the associated savings load shape. CEM is a population NMEC program and does not have fixed measures or incentives. MCE has contracted with Recurve as an implementation and administration partner. Recurve is tasked with relationship management and enrollment of aggregators, determining customer eligibility, analytics, determining payments to aggregators, and M&V. All incentive payments are tied to the delivery of savings at the meter level. Aggregators recruit customers and install projects, and Recurve tracks the impacts using CalTRACK[31] and the OpenEEmeter platform.[32] MCE's original intent was to pay aggregators at the conclusion of each year based on the impacts achieved, but the 2022 MCE CEM Implementation Plan states that, "aggregators are able to receive payments quarterly for value delivered at the portfolio level." [33]

Figure 3 below provides an overview of the program's logic model.

Figure 3. MCE Commercial Efficiency Marketplace Logic Model



Source: MCE 2021 Commercial Efficiency Marketplace Program Implementation Plan

[31] https://www.caltrack.org/
[32] https://www.lfenergy.org/projects/openeemeter/
[33] MCE Commercial Efficiency Marketplace 2022 Program Implementation Plan (version 9), pp. 21.

3.3.2 Comparison of CEM M&V Plan to NMEC Rulebook

This section explores and documents MCE's plans for submitting NMEC claims for this program, as described in its CEM M&V Plan[34], and how it adheres with the Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption (NMEC Rulebook).[35] The NMEC Rulebook summarizes CPUC's requirements for NMEC programs and lists the directives and policies that have been established by the CPUC for the administration and implementation of such programs.

As part of the NMEC Rulebook guidance, PAs must submit a program level M&V plan, as well as subsequent documentation containing a variety of elements enumerated below. For this effort, our team examined the MCE CEM M&V plan for alignment with these requirements.

Below we provide how MCE adhered to the relevant guidance in the NMEC Rulebook. These include:

- Program level M&V plan
- Qualifying projects/measures
- Baseline adjustment
- Savings claims
- Measurement period
- M&V report
- Data provision

Program Level M&V Plan

The evaluation team finds that the M&V plan is in alignment with NMEC Rulebook guidance except for two areas:

- T*he normalized weather data used for energy savings calculations*: According to the M&V plan, CZ2010 data will be used for modeling savings. The NMEC Rulebook notes that, "final savings claims must be normalized by long term weather based on the most up-to-date weather files (such as CALEE 2018).
  - In meetings with MCE staff, the evaluation team initially recommended MCE use CALEE 2018 for analysis *when modeling payable and claimable savings,* as MCE staff confirmed that CZ2010 data was being used for CEM energy savings calculations. We made this recommendation based on the NMEC Rulebook guidance and on our experience, which shows that more recent weather data (in this case CALEE 2018) better reflects impacts. In late January 2023, the evaluation team learned that MCE and Recurve rely on actual weather when calculating 2021 energy savings claims.[36] It is unclear whether Recurve is normalizing the weather data prior to use, which has been historically done to represent a typical year of energy use and should be more representative over the EUL of an installed measure versus the value based on actual year data. We do recognize that normalizing weather data (i.e., relying on "typical" weather data sets) is backward-looking and may not account for effects of climate change. Given this, it may be the case that using actual year weather data is the best proxy for savings over a measure's life (and possibly, even a bit low for HVAC-related

[34] MCE Commercial Efficiency Marketplace Population NMEC M&V Plan, DRAFT, November 2020.
[35] Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption, Version 2.0, Release Date: 7 January 2020. https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/n/6442463694-nmec-rulebook2-0.pdf
[36] See footnote 16.

measures). We recommend the CPUC consider whether Recurve's practice of using actual weather data complies with the NMEC Rulebook's guidance to rely on the most up-to-date weather files.

- *The application of a comparison group and a net-to-gross ratio to establish net savings*: The Rulebook guidance does not specify whether the use of a comparison group in addition to a net-to-gross ratio for developing net savings is appropriate. We recognize that methodologically there is no perfect approach to obtaining net savings with an opt-in program design with this population size. However, MCE's M&V plan uses an approach that could potentially incorporate double counting of spillover and/or free ridership. We recommend no adjustments to the approach.

Qualifying Projects/Measures

The M&V Plan notes that the CEM program promotes a wide variety of measures. "Recurve has used the deemed measures as a starting point for forecasting key cost-effectiveness parameters and qualifying measures anticipated to be the focus of the program…(which) include(s) lighting, HVAC, and heat pump fuel substitution measures."[37] However, should the CPUC have interest, it should work with MCE and an evaluation team to determine whether the program as implemented meets eligibility and modeling requirements. For example:

Inclusion of fuel substitution measures: The NMEC Rulebook provides no guidance on whether it is appropriate to include fuel substitution measures. However, MCE's M&V plan suggests that heat pump fuel substitution measures are eligible for the program. This has implications on measure qualification because depending on how many sites install fuel substitution measures, the Rulebook criteria that "energy savings from program interventions will be similar across all sites in the population" may not be met with the inclusion of fuel substitution measures.

Payable savings methodological approach: The Rulebook provides limited guidance on population-level methods appropriate for calculating payable savings. The M&V plan adheres to payment and incentive guidance; however, it is unclear whether payable savings are measured at a population-level versus an aggregator (or site) level. This is immaterial from a claimable savings review perspective but may be relevant from an adherence to Rulebook guidance perspective.

We recommend that MCE:

- Provide a record to the CPUC of the number of projects and the reported customer Coefficient of the Variation of the Root Mean Square Error (CVRMSE) throughout the program implementation period to ensure that the program design meets the modeling criteria.
- Ensure that specified calculations, data, and inputs are provided in a timely and complete fashion to support ex post impact evaluation.
- Assess the implications for fuel substitution measures on proposed population-level modeling should those measures be installed. We specifically recommend that the PA assess whether fuel substitution measures violate population-level modeling requirements, and if so, provide any proposed revisions to modeling approaches, issues associated with eligibility of measures and projects, and implications for ex post claims verification.

[37] MCE Commercial Efficiency Marketplace Population NMEC M&V Plan, DRAFT, November 2020. pp 16.

Baseline Adjustment

According to the NMEC Rulebook, a baseline adjustment is not applicable for population NMEC programs. In particular, "the application of dual baseline is not required when using NMEC methods to determine savings for accelerated replacement measures."[38] Therefore, the M&V plan appropriately excludes this requirement.

Savings Claims

We reviewed MCE's M&V plan to determine whether it specified the correct Rulebook requirements for savings claims. We found that the M&V plan provides sufficient documentation to align with requirements for savings claims, apart from the specified normalized weather data (see M&V plan assessment above). Upon completion of the program implementation period, the CPUC should consider having an evaluation team verify that MCE adhered to these requirements as part of an ex post evaluation.

Measurement Period

We reviewed MCE's M&V plan to determine whether it specified the correct Rulebook requirements for measurement period. We found that the M&V plan documents that sufficient pre- and post-period data will be collected as part of the M&V activities. Upon completion of the program implementation period, the CPUC should consider having an evaluation team verify that MCE adhered to these requirements as part of an ex post evaluation.

M&V Report

The M&V plan adheres with the NMEC Rulebook. Upon completion of the program implementation period, the CPUC should consider having an evaluation team verify that MCE adhered to M&V reporting requirements as part of an ex post evaluation.

Data Provision

We reviewed MCE's M&V plan to determine whether it specified the correct Rulebook requirements for data provision. We found that the M&V plan provides sufficient documentation to indicate that MCE will provide the necessary underlying data, inputs, and calculations to support third-party verification.

We recommend that the CPUC ensures that specified calculations, data, and inputs are provided in a timely and complete fashion to support ex post impact evaluation. Upon completion of the program implementation period, the CPUC should consider having an evaluation team verify that MCE adhered to these requirements as part of an ex post evaluation.

Appendix B provides a detailed crosswalk of our findings.

3.3.3 Pipeline Analysis

The CEM program consisted of two measures in 2021; lighting and HVAC fan VFDs. The breakout by building type and savings is presented in Table 4. The lighting only projects represent 83% of the energy savings and 100% of the demand savings, while VFDs represent 17% of the energy savings and 100% of the therms savings.

[38] NMEC Rulebook, pp. 8.

Table 4. Distribution of Building Type and Technology

Technology	Building Type	Number of Projects/Sites	Net Lifecycle Savings		
			kW	kWh	Therms
Lighting Only	Grocery	14	270	2,238,768	-
Lighting Only	Office	2	-	507,875	-
Lighting Only	Lodging	1	-	16,023	-
VFDs Only	Retail	9	-	558,032	18,668
Total		**26**	**270**	**3,320,697**	**18,668**

All the large grocery store lighting projects were carried out by a single company and one decision maker and represents 67% of the electric savings. The nine retail locations that installed VFD fans for HVAC represent close to 17% of the electric savings. The remaining two offices and one lodging facility represent nearly 16% of the program electric savings.

Overall, the lighting projects were typically whole building lighting retrofits installed in interiors and exteriors. Exterior lighting represented a small percentage of the lighting replaced, only 3%. Most of the existing fixtures were linear fluorescents that were replaced with LEDs, but there were also CFLs, halogens, and incandescent that were replaced. The office buildings replaced lights in office suites, shared spaces, and electrical rooms.

The large grocery stores were whole building lighting retrofits but included store remodel projects as well. As part of the remodel, there were fixtures that were completely removed and replaced with a different type of lamp. Those showed up in the calculator as a fixture that was removed and not replaced, or as a fixture that was installed without an existing fixture. In addition to the overhead store lighting, many of the fixtures that were replaced were case lighting measures where linear LEDs were installed.

Nine sites received VFDs for HVAC systems. The VFDs were installed on fans within packaged HVAC systems ranging from 47.5 to 265 tons. The nine sites are owned and operated by five different companies. These locations are responsible for 17% of the electric savings and 100% of the therm savings forecasted for the PY2021 CEM program.

Projects/EE Measures Installed to Date

The CEM program is measure or technology agnostic, as the savings is based on what is measured at the meter level. Aggregators can lean on their business models or areas of expertise to find customers that will benefit the most from participating. In 2021, 26 total projects were initiated under the program. These were mostly lighting projects (17/26) and some variable frequency drive (VFD) projects. Just over half of the projects occurred in grocery stores (14/26) but retail stores were also common (9/26). All projects have been single measure projects where customers received only lighting or VFD upgrades.

- According to MCE staff, further projects in the pipeline may include multiple measure projects as well as refrigeration and some fuel-substitution measures.
- According to MCE staff, there are two ways for aggregators to optimize benefits and payments in this program model. “One is measure selection to be delivering savings during high value times of day. The other is finding customers who are online during high volume hours and have opportunity to save” (MCE Program Staff Interview).

Incentives Paid in 2021

In the 2021 program budget, $931,750 was ear-marked for incentives payments (72% of the annual program budget).[39] All incentive payments are tied to the delivery of savings and are paid to the aggregators. Interviews with program staff, aggregators, and customers revealed the following takeaways regarding how incentives help motivate participation in the CEM program:

- Aggregator interest was higher than expected and 17 enrolled by the end of 2021. According to MCE staff, market interest from aggregators is greater than initially expected. In the first few months of roll-out, the program enrolled 10 aggregators and as of the end of 2021, 17 aggregators enrolled. Amongst them, only three submitted projects in 2021 from five different customers. The 17 aggregators signed Flexibility Purchase agreements, meaning that they did not necessarily sign up to participating in MCE's CEM specifically, but to participate in any other market program that Recurve is running as part of its Demand Flex Market Platform. "You can think of this as the blanket agreement that allows participation in any market. Essentially it is like a hunting license for the markets. If an aggregator wants to submit a project to a given market, they have to agree to the terms and conditions of that market" (Recurve CEM Staff Interview).
- Aggregators need time to learn the program concept, watch it progress, and build confidence. According to MCE staff, as of January 2022, most aggregators had recently enrolled in the program and are still learning about it as a new concept and watching to see the ramp-up before deciding to work with more customers and submit projects for incentives. MCE staff predicted wider aggregator interest and enrollment later in 2022 in response to R.20-11-003. The primary barrier to participation so far is the uncertainty involved in what the final performance-based savings will be and the subsequent incentive associated with those savings. MCE staff noted that aggregators are taking time to submit projects because it takes time to build confidence in the incentive payment that will be dispersed at the end of the metering period. Recurve is helping aggregators with analysis of potential energy savings to give them a sense of what they can likely expect as an incentive or realization rate against their forecasted savings estimates. To help motivate aggregators further beyond the incentive, MCE is working with the National Energy Improvement Fund (NEIF) to offer financing so aggregators can get paid earlier and not have to wait a full year for the incentive payment. "NEIF has brought what they are calling 'rebate bridge funding' to the table. Once aggregators complete a project, they can now be paid a part of that forecasted payment directly from NEIF" (MCE Staff Interview, 1/6/2022). PG&E's On-Bill-Financing program is also an option for CEM projects. The customers we interviewed noted that they received incentives for their projects upfront which helped encourage their enrollment with the aggregators.
- Incentives and flexibility are motivating aggregators. According to the aggregators we interviewed, their initial impressions of the program were positive, as they liked several program elements including flexibility in the equipment that is installed, quicker approval times and better incentives than they experienced in other programs. The features they prefer about CEM include: the independence to conduct prospecting with customers to find the right fit for the program, the ease of project submission, and the fast and collaborative review and approval of projects for participation.
- The incentives will have varying influence on customers given the flexibility around how incentives are paid. How the customer is incented is entirely between the aggregators and the customers in terms of if and how they want to split the incentive between parties. The program only cuts one check and that is to the aggregator. We learned from the customer interviews that aggregators, to date, provide them a flat incentive, even though their performance in energy savings determines the actual incentive

[39] MCE Commercial Efficiency Marketplace 2021 Program Implementation Plan.

amount that aggregators receive. The customers noted that that their interest in participating was based on receiving the best return on investment available, and that is what motivated them to sign their projects up with the aggregators.

3.3.4 Program Influence

Aggregators

Though there are no claimed savings in 2021 for projects carried out through this program, we interviewed two of the aggregators who had participated in the first year to explore if and how the program influenced the projects so far.

- The two aggregators said the program did expand their ability to get more customers and that the project scopes were larger than they would have been under another program.
- The two aggregators rated program influence quite high, providing scores of 8 or 10 across a number of program factors.

Table 5. Aggregator Program Influence Scores

How influential were the following factors on your participation? On a scale from 1-10, where "1" is "not at all influential" and "10" is "very influential", how influential was/were…	Aggregator 1 Scores (submitted 23/26 projects)	Aggregator 2 Scores (submitted 2/26 projects)
Incentives	8	10
Information shared by MCE about program	N/A - did not receive much information	10
Information shared by Recurve about program	8	10
Age of customers' old equipment	8	Don't Know
Your previous experience with similar projects or programs	10	10

- We also asked aggregators if the program led them to recruit customers with EE projects that allowed for load shifting opportunities, as incentives are in some part affected by when program savings occur. Only one aggregator could answer this question and he mentioned that customers were mainly driven by energy reduction in general, as opposed to load shifting.

Customers

We interviewed two of the five unique customers who worked with aggregators on CEM-supported projects in 2021. Together, they represent ~85% of the forecasted annual electric savings associated with all projects that were enrolled in 2021. One of the customers we interviewed completed VFD fan upgrades for HVAC at nine locations and the other completed lighting upgrades at 14 locations. We contacted customers and asked questions about the projects they completed, their awareness of participating in MCE's CEM program, their satisfaction with the aggregator and the factors that influenced their decision-making. We were cognizant that

customers may not be aware of the CEM program since aggregators are the ones who directly engage with MCE and Recurve. We kept this in mind as we conducted the customer interviews. To understand the influence of the program, we therefore asked customers about how their aggregator influenced their decisions to carry out their EE projects. The findings by topic are summarized below:

Table 6. Customer Interview Findings

Topic	Finding (n=2 customers representing 85% of forecasted savings from 2021)
Projects they completed (e.g., what were the costs associated with the projects, what sort of savings they expected from the retrofits, and how much incentive they received from the aggregator)	One customer completed 14 lighting projects at grocery stores. The costs of these projects ranged from $54,000 to $360,000 and averaged $105,000. The annual forecasted savings ranged from 41 MWh to 460 MWh, averaging about 160 MWh per year. The other customer completed 9 VFD fan upgrades for HVAC equipment at 9 retail locations associated with five companies. The costs of these projects ranged from $5,000 to $48,000, averaging about $30,000 per site. Annual forecasted electric savings for these projects ranged from 25.5 MWh to 150 MWh, with an average MWh savings equal to 95.6 per year. The annual forecasted therm savings ranged from 3,300 therms to 19,800 therms and averaged about 8,600 therms. Since incentives are paid directly to the aggregator, we did not have a record of how much the customers received. During interviews, neither recalled the flat incentive paid to them.
Awareness of participating in MCE's CEM program	MCE informed the evaluation team that customers may not be aware their projects have been enrolled by their aggregator in the program. As dictated by the program's design, the customers engaged with the program through their aggregator, which happened to be the same for both. The customers noted some awareness of MCE's involvement but did not have any specific knowledge of the program. Additionally, the customers did not know aggregators receive incentives based on their actual savings delivered over a year through the CEM program, as they both received a flat rebate amount from the aggregator.
Satisfaction with the aggregator	Both customers noted high satisfaction with the aggregators they worked with. They both ranked their satisfaction at a 9 on a scale from 1 to 10 where 1 is very dissatisfied and 10 is extremely satisfied. They attributed their satisfaction to the return on investment the aggregator was able to secure and their familiarity with the aggregator, as both customers had previous experience with them. Additionally, the customers noted that their aggregator took care of all rebate applications and made the process of installing the equipment easy.
Factors that influenced their decision to upgrade their equipment	One customer said he had planned to upgrade the VFD fans for HVAC equipment prior to the aggregator getting involved. The other said that the aggregator came to him with the lighting project idea. Both customers noted that their companies were looking for the best return on investment and the aggregator was able to provide that. When asked how likely they would be to work with the aggregator again on a scale of 1 to 10 where 1 is not at all likely and 10 is extremely likely, both customers gave a 10 out of 10. This brings promise of the aggregators developing a pipeline to bring additional savings through the CEM program.

3.3.5 Lessons Learned from Implementation

A summary of the key lessons learned so far from staff involved in implementing the program, the 2/3 aggregators that submitted projects, and the 2/5 customers whose projects were enrolled by their aggregators in 2021 is bulleted below.

- A new program concept takes time to launch. According to MCE staff, it took a bit of time to ramp up the program due to the program design being a new concept for the marketplace.
- Time and information are helping aggregators overcome uncertainty. According to Recurve staff, this is a new business model for aggregators and there is some uncertainty associated with taking on performance risk. However, after some time in the market, Recurve is starting to see aggregators become more comfortable with the program design and experiences more interest and engagement in 2022 as they start to realize that this design can have great benefits for the aggregators and their customers, in addition to the grid benefits. Aggregators are leveraging their existing relationships with customers and have started to enroll their projects in the CEM program. As aggregators earn incentives through the performance of the projects, they will feel more comfortable enrolling more projects from their customer base and may also use this as an opportunity to acquire new customers.
- Enrollment requirements can be a barrier to participation. According to Recurve staff, simplicity is important for program success but keeping it simple has been a challenge in the face of filings. It has been a challenge to balance the data requirements from aggregators with the need to also not overly burden them. Aggregators want an easy and simple pathway to actively engage in the program. According to one aggregator, the enrollment process was a "rollercoaster ride" based on all of the documents that needed to be reviewed and signed, including non-disclosure agreements and insurance documents. One of the two customers did note that they were not aware of the requirement not to make additional changes for 12 months after project installation. During the interview, the customer said, "We certainly would not want to agree to something that would put us in a situation where we cannot be competitive with [NAME OF COMPETITOR] because they are offering their customers multi-channel opportunities for the method that they can make purchases."
- Aggregators need assistance with forecasting savings. According to Recurve staff, they have learned what aggregators truly need from the program regarding information and tools. Specifically, aggregators mainly need help from the program with how to best forecast savings. Further, they need time to build confidence in the savings forecast tools to ensure further and deeper program engagement in the future. The two aggregators interviewed for this evaluation mentioned that they are satisfied with the tools and support from Recurve so far. Recurve does operate a portal that allows aggregators to enter customer data and the EE project they would like to enroll and can generate forecasts of energy savings.
- Aggregators can be motivated to participate based on analyzing the performance of projects they have submitted to past programs. According to Recurve staff, the most engaged aggregator in the program so far was motivated to participate in CEM after program staff analyzed the project performance associated with projects they submitted in the past to other programs. Program staff was able to use these analytics to convince the aggregator that they would benefit more from participating in CEM than other program models in which they had previously engaged. "We had analyzed some of their projects and had been working with them on what was valuable. What we found for this segment of projects was if they served this set of customers, their realization rates on forecasts were 105%. So, they were slightly under forecasting, which was great. The value that would have been delivered had they enrolled in this program versus another was tremendously greater based on the load shape they were saving. So, the aggregator said, well I have a business type that I get consistently good savings returns on my

forecasts. And I have a business type that those savings returns are far more valuable in this model than other ones. That took them from a being a "maybe" to a "yes, this is how I want to move" (Recurve Program Staff Interview, 2/10/2023).

- Careful attention must be given to the meter ID numbers associated with projects. Program staff has learned that Account ID numbers change frequently for sites. Some sites have multiple Account IDs, and as a result, they have had to develop a decoder, or unique variable, to ensure they have continuous and consistent data from a participating site. "That has been a really crucial development on our side because we had aggregators submitting SAIDs to this tool where they could type it in and say, is this meter eligible. And it was returning that this SAID does not exist. They escalated this to us, and we found that SAIDs were changing much more frequently than we had anticipated. Even though the same customer had been on site for a significant length of time. In one case, we had a customer that had been on site for 10 years and the SAID that was submitted by the aggregator was not the correct one" (Recurve Program Staff Interview).
- Program design appeals to aggregators but attention is needed to simplify requirements and track project performance. The two aggregators we interviewed mentioned that program design elements (specifically collaboration with Recurve), ease of enrollment, and incentive availability appealed to them the most. When asked what elements need improvement, aggregators mentioned that some of the requirements for pre and post projects, such as gathering photos and documentation, were redundant between stages and could be streamlined. In addition, aggregators mentioned the need to keep better track of NMEC data, pre and post project. The customers we spoke to find the participation process simple, as they were not involved in the enrollment of their projects. The aggregators completed rebate applications and associated paperwork, thus taking the burden of participation off customers.

3.3.6 Reasonableness of Ex Ante Savings Values

We assessed the reasonableness of the ex ante savings submitted in 2021. To meet this objective, we performed two tasks:

- A review of the ex ante savings reported for each installed measure and compared them to DEER and eTRM values.
- A comparison of the project level forecasted savings values to each facility's Customer Information System (CIS) consumption data.

Ex Ante Savings Review

We reviewed the MLC runs that were included in the project documentation to ensure the inputs and results were reasonable. This involved reviewing parameters such as wattage, quantity, and operating hours, as well as overall checks to make sure the project level savings were within reasonable ranges for the building type and operation.

The first parameter we reviewed was the HOU. We looked up and confirmed the hours that the grocery stores were open and compared this to the claimed hours by activity area. Only one of the grocery stores listed its hours as being open 24 hours a day, with the remaining stores closing at night. Six of the eight sites claimed that all their indoor lighting operates 8,760 hours per year, which would mean that the lights never turn off. The two sites that did not claim 8,760, claimed hours in line with their business hours for those lights installed in stock rooms, storage, restrooms, and employee areas. Therefore, some of the other sites claiming 8,760 for all lighting but are not open 24/7 may be overstating operating hours in some areas of their facility.

Next, we used lighting wattage tables to determine the wattages associated with the fixture descriptions. We completed this for both the existing and installed fixtures. While the wattage tables worked for the existing equipment, most of the descriptions of the LEDs were model numbers. Given this, we verified the installed wattage using product specification sheets. The descriptions for many of the linear fluorescents were general fixture descriptions so the wattage tables were used to check that the wattages were reasonable. In addition, there were many lamps, typically CFLs, parabolic anodized reflectors, and halogens which did not provide enough information to determine the wattage. For those, we relied on engineering expertise to determine if the claimed wattages were reasonable. For most of the fixtures the wattages were determined to be within a reasonable range, but there were a few wattages that were outside the expected wattage ranges. Those instances of differing wattages were not significant, and we believe that the wattages used are generally within expected ranges.

In addition, we checked the quantity of lamps associated with the retrofit. As mentioned in the previous sections, some of the grocery store projects were remodels so it was not a one-to-one replacement. This meant that we could not compare the lamp counts for all the records. For the records that were replacement fixtures, the evaluation team checked to make sure that a similar amount of light was installed as the existing fixture. We found that there was a small amount of delamping, which is reasonable for a lighting retrofit and could still feasibly produce sufficient light for the space. Overall, the lamps were predominantly replaced by the same number of lamps as the existing fixtures.

The VFD savings were based on the eTRM measure for Enhanced Ventilation for Packaged HVAC units. The evaluation team verified that the deemed savings were applied correctly for most of the records based on the type of unit, climate zone, and building type. The gas unit energy savings for two of the records did not match up with what the eTRM states. The evaluation team tried to find reasons for the discrepancy, but there was no description to support the savings.

Consumption Comparison

As mentioned, the objective of this task was to assess the reasonableness of the forecasted savings by comparing the overall project level ex ante savings values to CIS billing data. The tracking data provided account numbers, service ID numbers and/or customer contact information (such as name and address). Using these values, we successfully merged the tracking data to CIS billing data from 2019 to Q1 of 2022 for each participant. The tracking data also provided an installation date which allowed us to identify pre- and post-installation energy consumption.

Our first test for reasonableness was to compare the gross ex ante kWh savings to the pre-installation annualized energy consumption. For this analysis, we compared savings to the 2020 calendar year usage.

- Large Grocery Stores: For the 14 large grocery stores, ex ante savings were between 7% and 17% for all but two sites; one of which was 3% and the other 25%. Aside from these two sites, this range of savings is within the expected range based on the measures being installed and the contribution that lighting typically makes to whole premise consumption in a large grocery store.
  - The site with only 3% savings had a much smaller retrofit than the other stores, which explains the low savings.
  - The site with 25% savings replaced several high wattage halogen and metal halide lamps, which were not typically found in the other sites, explaining the higher savings value.
- Large Office Buildings and Lodging: The two large office buildings had ex ante savings that were 14% and 21% of 2020 consumption, and the lodging participant's savings was 19% of consumption. These values are within the expected range based on the measures installed and the contribution that

lighting typically makes to whole premise consumption in large office buildings. Although the 19% and 21% may appear on the high side, the pandemic is likely to have reduced consumption during 2020, resulting in a higher savings ratio. The pandemic is much more likely to have affected usage in these building types than in grocery stores.

- Large Retail: For the nine large sites that installed VFDs, seven had ex ante savings between 10% and 13% of usage. These values are within the expected range based on the measures installed and the contribution that HVAC typically makes to whole premise consumption in large retail buildings.
  - One site had savings that was only 1% of savings, but installed fewer VFDs than the other sites, explaining the low percentage.
  - Another site had savings of 20% of ex ante savings, but this site had consumption significantly less than a similar store.

Our second step was to compare the gross ex ante kWh savings to the difference observed between the pre- and post-installation annualized energy consumption. Due to the timing of the evaluation, we only had billing data through April 2022 and so did not have a full year of post-installation data. We used the same set of calendar months in our comparison and normalized the usage to the number of days that were in that aggregated billing period. For example, if the installation date was in July 2021 and we only had billing data through April 2022, we would use August 2021-April 2022 as our post period and August 2020-April 2021 as our pre period. Because the number of billing days may differ between these two cycles, we normalized the comparison to the same number of days.

It is important to keep in mind that we conducted a very high-level comparison given the short duration of post-period data, and that there are many other factors that could influence usage during the pre and post period, such as the pandemic, changes in weather, and/or other non-routine events that occurred at the facility. None of these factors were addressed in this analysis but should be in a future impact evaluation. Additionally, a future evaluation could include collection of primary data from customers to understand any non-routine events that may have occurred during pre- and post-project installation periods to provide context to the savings observed, particularly when comparing them to the forecasted ex ante net savings.

- Large Grocery Stores: For the 14 large grocery stores with CEM projects in 2021, consumption was reduced by 4% to 14% for all but one site. This compares well to the 7% to 17% ex ante savings value discussed above. The difference could be a result of lower pre-installation usage than normal due to the pandemic, changes in weather, and/or other non-routine events in addition to the HOU issue discussed earlier.
  - Note that the site mentioned above with ex ante savings that was 25% of 2020 consumption, exhibited the largest decrease in pre to post usage of 14%.
  - Also, the site mentioned above with ex ante savings that was 3% of 2020 consumption, exhibited the second smallest decrease in pre to post usage of 5%.
  - The one site not in this 4% to 14% range had very similar pre- and post-usage. However, if we compared post-installation usage to a pre-period one year earlier, the post usage was 4% less than that pre-period. It is possible that the installation occurred at an earlier date than reported, or perhaps there are other factors that affected usage unaccounted for in this analysis.
- Lodging: The one lodging site experienced an increase in usage from 2021 to 2022, likely a result of the pandemic, making this analysis unreliable. The forecasted first year net electric savings for this project was 16.5 MWh.

- Large Office Buildings: The two large office buildings exhibited a decrease in usage from the pre- to the post-period by 13% and 14%, which compares well to the 14% and 21% ex ante savings values, respectively. Pre-period usage in large office buildings is also likely to have been more affected by the pandemic than the post-period, which may explain the difference in these values. Again, weather or non-routine events may also be factors affecting the comparison.
- Large Retail: The pandemic likely had a significant effect on usage for this building type, making this early analysis somewhat unreliable. Of the nine large retail sites, three were big box home improvement stores, which were likely to be less affected by the pandemic than some of other large retail businesses in this population. Of these three big box home improvement stores:
  - One site exhibited little change between the pre and post usage, but this was also the site with only a 1% ex ante savings estimate.
  - Another exhibited a 13% decrease in usage, compared to a 10% ex ante.
  - The third site exhibited a 4% decrease in usage, compared to an 11% ex ante value.

3.3.7 Evaluability Assessment

MCE is collecting all the necessary data to conduct an evaluation. This includes:

- Detailed information on the equipment installed and removed at the measure level, which would allow for estimation of measure-specific savings.
- Account and meter IDs used to merge CIS, monthly billing, and AMI data. However, only a single meter ID number for each site was provided. Although the account ID (as well as address and other contact information provided) can be used to identify all meters associated with the site, it would be ideal to include the set of meter IDs that were affected by the retrofit, as not all meters may be affected. This would help to better isolate the savings. However, because a comparison group analysis is being used to estimate savings, it is likely that whole premise data would be required. Providing a full set of meter IDs associated with the site would also reduce the likelihood of improperly aggregating consumption data to the site level.
- Installation and completion dates to determine the pre- and post-installation periods for analysis.
- Location (address) of the facility to determine the correct weather data to use for normalization and aid in possible control group matching.
- Building type information (along with other firmographic data available on the CIS that can be obtained by merging account ID) to aid in control group matching.
- Customer contact information that would allow for any surveys to be conducted to support either a gross or net impact evaluation.

Although information is not gathered about any potential non-routine events, MCE's CEM M&V plan states that "in the process of customer acquisition, aggregators will verify with customers that they have not nor do they plan to install major new load additions or subtractions, solar PV, or EV charging in the reporting year (post-program implementation). In addition, aggregators will work with Recurve and MCE to ensure that customers are not participating in another energy efficiency program, have not installed an EV charging system or solar PV or battery storage within the baseline year." It may be useful to follow-up after installation (during or after the post-installation analysis period), to ensure that no non-routine events have occurred. However, the M&V plan also lays out an analytic approach to screen projects for possible non-routine events. From an evaluator's

perspective, customer contact information is provided, so customers could be surveyed about any non-routine events that may have occurred during the analysis period.

3.3.8 Recommendations

Based on our early look at the CEM program, we make a few recommendations to help streamline program implementation and ensure MCE gathers the appropriate information from aggregators and customers to facilitate evaluation, should the CPUC elect to do so.

Program Implementation

Ensure aggregators carefully communicate the participation requirements to customers when enrolling their projects, particularly the requirement that the customer make no major changes for the 12 months following the EE project. One customer who is charged with energy management of a chain of grocery stores said he would not have agreed to carry out the CEM rebated project if he was limited in the future projects he could carry out during the post-installation period.

Qualifying projects

While the CEM M&V plan generally aligns with the NMEC Rulebook, we recommend MCE pays careful attention to the similarity of projects enrolled in the program. As stated in the NMEC Rulebook, "Population-level NMEC program sites must have building-type similarity such that…energy savings from program interventions will be similar across all sites in the population."[40]

Ensure careful review of the eTRM and hours of operation data when calculating claimed savings. We found a few issues with the measure level ex ante savings estimates. It is possible that the hours of operation maybe be slightly overstated for some grocery stores that claim all lighting is illuminated 24/7, but do not operate 24/7. Further, two VFD claims did not match with the eTRM and there was not enough documentation to explain why.

Data Collection

Based on our evaluability assessment, we found MCE provided a single meter ID number for each project site. If more than one meter ID is affected by a project at a given site, we recommend MCE include all meter IDs that are affected by the retrofit. If only one meter was affected, it would be useful to note this information in the program tracking data. Providing a full set of meter IDs associated with the site, if applicable, will reduce the likelihood of improperly aggregating consumption data to the site level.

[40] NMEC Rulebook, pp.12

4. Commercial Upgrade Lighting Evaluation

4.1 Introduction and Background

This section focuses on the evaluation of custom and deemed lighting measures rebated under the Commercial Upgrade program savings measured in net evaluated (ex post) lifecycle energy and demand savings realized in PY2021 by MCE. We examined the savings coming from lighting measures rebated through MCE's Commercial Upgrade program because they represent a sizable contribution to the PY2021 program savings (83%). Notably, the Commercial Upgrade program contributed 86% of MCE's first year electric savings to its PY2021 energy efficiency portfolio.[41] In this section, we discuss researchable issues, information on the lighting technologies we evaluated, data sources we used, approach we used for sampling, verification analysis, and methods for determining evaluated gross and net lifecycle energy impacts. We use the results and findings from the analysis to recommend updates for the NTGRs and gross/net first year and lifecycle savings for the evaluated lighting measures.

The objective of this component of the evaluation was to perform a measure or measure-parameter level impact evaluation utilizing new primary data collected via telephone survey to update claimed (ex ante) gross and net savings estimates and inform future savings values for nonresidential LED lighting measures installed by MCE. The parameters we examined included installation/verification rates, Unit Energy Savings (UES), NTGRs, gross and net energy savings values, effective useful life (EUL) and savings impact load shapes.

This evaluation focused on three types of LED measures that MCE rebated through the Commercial Upgrade Program:

- Interior Custom LED Lighting—LED fixtures that typically replace older fluorescent options.
- Exterior Custom LED Lighting—LED lamps that typically replace high-intensity discharge lamps.
- Deemed TLED Lighting—LED tubes that replace T8 fluorescent tubes in an existing fixture.

The research objectives support the development of net and gross ex post impacts for the lighting measures we list above. Rather than develop a full, comprehensive analysis on all parameters within the savings algorithm, this evaluation focuses on those parameters that introduce the highest uncertainty in the estimate of savings. The following tasks utilize new primary data collected from participant telephone surveys to develop evaluated net lifecycle savings:

- Confirm installations (quantity verification) and installation type (ARs). We conducted telephone interviews with participating sites.
- Estimate operating hours and use HOU shapes to support the estimate of gross evaluated impacts and 8,760 impact load shapes.
- Develop EUL estimates based on evaluated operating hours. For AR measures, develop remaining useful life (RUL) estimates based on the remaining life of the still-viable measures removed.
- Estimate participant free ridership to support the development of NTGRs and net savings values.
- Develop gross and net realization rates (GRRs and NRRs) and NTGRs—both first year and lifecycle.
- Estimate first year and lifecycle gross and net evaluated impacts (kWh, kW).

[41] CEDARS Claims for MCE PY2021 retrieved from https://cedars.sound-data.com/reports/summary/.

The LED measures that MCE rebated in PY2021 represent roughly 40% of the total megawatt hour (MWh) energy savings reported by the Commercial Upgrade program over the life of the lighting measures (lifecycle savings). Table 7 presents the distribution of reported MWh energy savings by each of the lighting measure types.

Table 7. PY2021 Claimed Lifecycle Gross Savings for Lighting Measures

2021 Lighting Measure	Lifecycle Gross Savings Claimed		Engineering Lifecycle Gross Savings (no 0.9 GRR)	
	MWh	MW	MWh	MW
Custom Interior	9.353	1.1	10,393	1.2
Custom Exterior	11,194	0.1	12,438	0.1
Deemed	205	0.0	205	0.0

In compliance with CPUC Decision D.11-07-030, gross savings claimed for all custom measures incorporate a realization rate of 0.9.[42] The set of "engineering" lifecycle gross savings presented in the last two columns of Table 7 show the savings without the 0.9 realization rate, as these are directly comparable with gross evaluation estimates. Decision D.11-07-030 does not apply to deemed measures, so for these, the two sets of savings are identical. A key result of this evaluation will be to update the claimed 0.9 realization rate with an evaluated GRR. Therefore, the evaluated gross savings developed in this report will often be compared to the claimed engineering gross savings, which forms the basis for the evaluated GRRs.

The aggregate measures listed comprise two unique custom interior LED measure types (High Bay and General Area Lighting), four unique custom exterior LED measure types (Wall Mounted, Pole Mounted, Canopy, and Other LED), and one type of deemed LED measures (TLED tubes that replace T8 fluorescent tubes in existing fluorescent fixtures with electronic ballasts). The evaluation team mapped each claim in the tracking data to one of these three categories.

4.2 Overview of Impact Evaluation Methodology

Our evaluation team utilized a GRR approach to develop gross evaluated kW and kWh savings for the PY2021 LED measures described above. For each of the measure types, we estimated site-specific gross evaluated impacts for a sample of program participants. We then compared those impacts to the claimed "engineering" savings for each site-measure to develop a ratio of evaluated to claimed gross savings. To develop program population estimates of evaluated gross savings, our team calculated aggregate GRRs by measure type and applied these rates to all reported savings.

To develop the claimed savings values, MCE used the MLC that uses DEER values as inputs to the savings calculations. Each custom project claiming savings had an MLC that was used to calculate savings for the specific project. For a sample of projects, we revised certain parameters within the project-specific MLCs (same version as the original) to estimate evaluated savings, as discussed below.

MCE reported all Commercial Upgrade program lighting projects as AR projects, meaning (1) the customer installed the rebated LEDs to replace older lights that were still viable, and (2) the program influenced the customer to replace these older lights earlier than they would have in the absence of the program. Based on survey responses, six out of 40 participants indicated that their old lights were failing or that they were actively

[42] D.11-07-030 p. 38 OP6: https://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/139858.pdf.

planning a lighting upgrade and would have done the same lighting upgrade in the absence of the program. We reclassified these six as NR projects and adjusted the MLC inputs to NR.

Measures classified as AR have savings that use a dual-baseline approach. The first baseline is applied to a period corresponding to the RUL of the replaced equipment. The first baseline is based on the wattage of the replaced equipment. For the rest of the installed equipment's EUL, the second baseline wattage is set to an industry standard practice value.

For the custom interior LED measures, we developed individual HOU and coincident demand factors (CDF) for each site for which we conducted interviews. If the HOU or CDF differed by more than 25% from the DEER numbers in the MLC, we replaced the DEER HOU; we then relied on the MLC to calculate the updated annual energy savings.

For the custom exterior LED measures, we accepted the 4,100 hours recommended by DEER, and we relied on the MLC to calculate the first and second baseline annual energy savings.

For the deemed TLED measures, we verified that the program tracking data contained the correct first baseline savings. We replaced the second baseline savings with zero as per the SWLG009-02 Workpaper.[43]

For all measure types, we calculated the EUL based on updated HOU and applicable guidelines and used a five-year RUL to recalculate lifecycle savings.

To develop net savings values, we first estimated an NTGR utilizing a standardized Self-Report Approach (SRA) based on participant telephone survey data. We applied the resulting NTGRs to the claimed gross impacts to estimate net savings for the population of program participants.

This SRA methodology provides a standard framework, including decision rules, for integrating findings from both quantitative and qualitative information in the calculation of the NTGR in a systematic and consistent manner. The method uses a 0 to 10 scoring system for key questions used to estimate the NTGR, rather than using fixed categories with assigned weights. The survey asks respondents to jointly consider and rate the importance of the many likely events or factors that may have influenced their energy efficiency decision-making for the project in question, rather than focusing narrowly on only their rating of the program's importance. This question structure more accurately reflects the complex nature of real-world decision-making. The structure helps to ensure consideration for all nonprogram influences when assessing the unique contribution of the program to the energy efficiency project's implementation.

The customer telephone surveys we used for this analysis included the same questions as the surveys in the deemed lighting evaluations for the 2017–2020 program cycle, such as those used in the CPUC's Final Impact Evaluation, Nonresidential Lighting Sector Program, Program Year 2020.[44] The 2020–2021 Custom (Group D) evaluation is modifying some of these questions to revise the methodology. We did not capture those changes in the survey we implemented, as the updated custom survey became final only after the data collection for this study had concluded.

[43] To access this workpaper and others, visit http://deeresources.net/workpapers. To find the SWLG009-02 Workpaper, perform a search for LED Tube Type A in the listed Workpapers section of the site.
[44] California Public Utilities Commission, prepared by Quantum Energy Analytics, *Final Impact Evaluation, Nonresidential Lighting Sector Program, Program Year 2020*, April 28, 2022, https://www.calmac.org/publications/__AllSections_Final_w_Apps.pdf.

4.3 Data Sources and Sample Design

The evaluation team utilized a variety of data sources to support the development of site-specific GRRs and NTGRs for the nonresidential LED lighting measures in this study. We supplemented existing data sources with new primary data collection via customer telephone surveys.

4.3.1 Program Tracking Data

Prior to data collection and sample planning, we reviewed MCE's Commercial Upgrade program tracking data for PY2021 participants. MCE uploaded the data to a centralized server during the reporting period for PY2021. The evaluation team analyzed, cleaned, recategorized, reformatted, and merged these separate data sets into one program tracking database. Within the database, we reviewed the nonresidential LED lighting measure groups to gain insight into the number of program participants receiving rebates for PY2021, and the claimed savings associated with those measure installations. This information informed the data summary we presented in Table 7 and the evaluation sampling plan we provide Section 4.3.5.

4.3.2 Measure Verification and Facility Operation Surveys

The evaluation team conducted telephone surveys with customers who installed LED measures through the Commercial Upgrade program in PY2021. The purpose of these telephone calls was to collect site-specific information we could use to support the parameter estimates in the MLC calculator. Specifically, the survey verified the type and location of the newly installed lighting measures, the rebated quantities, and whether the new lighting fixtures were controlled by a switch, an occupancy sensor, a time clock, an electric panel, or a photocell. Finally, we collected self-reported data on lighting equipment usage schedules and business hours to aid in the development of pre- and post-retrofit load shapes. Table 8 presents the number of participants in the population, sample, and survey.

Table 8.Commercial Upgrade Lighting Participant Survey Sample Summary

Population		Sample		Survey Respondents	
N Count	Percent	n Count	Percent of Population	n Count	Percent of Population
80	N.A.	68	85%	40	50%

Nearly all customers confirmed installation of the lighting measures and quantities reported in the program tracking data. We verified that the quantities reported match those used in the MLC savings calculator. We found a data entry error in one MLC, which we corrected.[45]

In the estimation of lighting HOU at each site, we used adjustment factors developed in past evaluations, as described in the Final Impact Evaluation, Nonresidential Lighting Sector Program, Program Year 2020.[46] The operating hour analysis also included the control type of the post-retrofit equipment. The adjustment factors are different for measures that function with an occupancy sensor compared to those that function with a switch. No adjustment factors are available for rebated measures installed on circuits connected directly to time clocks, electric panels, and energy management systems (EMS), because such configurations were rare

[45] The fixture quantity for the removed measures in project MCE-2021-02-02-305 matched the quantities documented in the project invoice, but the fixture quantity for the installed measures did not. We reset the fixture quantity for the installed measures so that it matched the fixture quantity for the removed measures.

[46] California Public Utilities Commission, prepared by Quantum Energy Analytics, *Final Impact Evaluation, Nonresidential Lighting Sector Program, Program Year 2020*, April 28, 2022, https://www.calmac.org/publications/__AllSections_Final_w_Apps.pdf.

at the time when the adjustment factors were developed. Table 9 shows the control types for the surveyed sites.

Table 9. Distribution of Controls at Surveyed Sites

Building Type	Interior LEDs			Exterior LEDs
	Occupancy Sensors	Switch	Other	All
Assembly	1	0	0	2
Education	0	0	0	1
Manufacturing—Light Assembly	2	16	0	1
Office—Large	0	1	0	3
Office—Small	1	0	0	0
Restaurant	0	1	1	0
Retail—Large	0	0	0	1
Retail—Small	0	7	1	0
Warehouse	1	0	0	0

Most interior LED measures installed through the Commercial Upgrade program in PY2021 had switches or occupancy sensors as controls, with a small percentage of the measures controlled by time clocks, EMS, or photocells. All customers reported that photocells controlled their exterior LEDs.

4.3.3 Program Influence Telephone Surveys

The customer telephone surveys we describe above also included questions in support of the NTG analysis. The surveys recorded program influence responses from participating site building owners and operators. The sample included participating sites that installed LED lighting measures. Section 4.5 has a detailed description of the self-report attribution and NTG analysis. Overall, we administered the surveys to

- Identify the facility type;
- Identify the replaced equipment along with the age and condition of the equipment prior to the retrofit;
- Estimate NTGRs for each evaluated project through an analysis of surveys; and
- Estimate NTGRs for the entire population sample frame from the surveyed sample of projects.

4.3.4 DEER and MLC

The evaluation team reviewed the SWLG009-02 workpaper that governs the deemed TLED measures installed in PY2021, and all relevant lighting dispositions that impacted the deemed and custom measures in this evaluation. For the deemed lighting measures, we conducted a comparative analysis using claimed parameter estimates from workpapers, unit energy consumption values from workpaper calculation sheets, and lighting parameters from program tracking. We were able to use DEER parameter calculations to confirm the first baseline savings reported by MCE. However, DEER stipulates zero second baseline savings for deemed TLEDs and EULs and RULs of five years, whereas the Commercial Upgrade program reported nonzero second baseline savings, with EULs of 15 years and RULs of five years.

MCE provided project documentation for many of the PY2021 projects, including all projects for which we completed customer surveys. Among other information required for custom projects, each project folder contained the MLC that was used to estimate energy savings for that site. We relied on the MLCs first to verify

the quantities and savings claimed and then to calculate first and second baseline savings based on updated measure type (NR vs AR) and hours of use.[47]

4.3.5 Sample Design

Under the Commercial Upgrade program, customers implemented 80 projects that installed LEDs in nonresidential applications. We attempted to contact a census of the participants to develop evaluation savings with the highest possible level of precision. We were able to complete surveys with 40 participant sites, most of which installed a mix of the LED measure types we studied.

Table 10 shows the number and types of LED measures installed at these 40 sites, and the reported energy savings. The sampled projects account for 56 percent of total Lifecycle LED savings that the program reported in PY2021.

Table 10. Claimed Lifecycle Gross Savings for Lighting Measures at Sites where Participants Completed Surveys

2021 Lighting Measure Type	Number of Sites	Lifecycle Gross Savings Claimed		Engineering Lifecycle Gross Savings (no 0.9 GRR)	
		MWh	MW	MWh	MW
Custom Interior	31	5,096	0.6	5,662	0.7
Custom Exterior	22	6,429	0.0	7,143	0.0
Deemed	6	205	0.0	205	0.0

4.4 Gross Impacts

The gross impact evaluation used the answers provided by survey respondents to confirm measure installation type and to estimate HOU and demand coincidence factors as we describe in the sections below.

4.4.1 AR Verification

All PY2021 Commercial Upgrade program lighting projects were reported as AR. To confirm that projects indeed replaced lighting measures that were still viable, we analyzed responses to a series of survey questions as follows:

ARQ2. Were you actively planning a space renovation or lighting upgrade or major repair prior to contact with the program?

1. Yes
2. No
88. Refused
99. Don't know

ARQ3. If you had not replaced your lighting under the program, how long do you think you would have waited to replace your lighting system? Would you have . . .

1. Replaced old fixtures one at a time as they failed, but never have done a full system change out?
2. Done a full system change out within a year of when you installed the new equipment under the program?

[47] We edited the original MLCs to substitute NR for AR and evaluated HOU/CDF values for DEER values. The "evaluation MLC" is the same version as the original MLC for each site.

3. Done a full system change out in 1 to 3 years?
4. Done a full system change out in 4 years or later?
88. Refused
99. Don't know

N5b. Using the same scale as before, if the program had not been available, what is the likelihood that you would have done this project at the same time as you did?

Record 0 to 10 score.
88. Refused
99. Don't know

N6. Now I would like you to think one last time about what action you would have taken if the program had not been available. Which of the following alternatives would you have been MOST likely to do?

1. Installed/Delamped fewer units
2. Installed standard efficiency equipment or whatever was required by code
3. Installed equipment more efficient than code but less efficient than what you installed through the program
4. Done nothing (keep existing equipment as it is)
5. Done the same thing I would have done through the program
6. Repair/rewind or overhauled the existing equipment
77. Something else (Specify: _____)
88. Refused
99. Don't know

To reclassify a customer from AR to NR, they must have:

- Responded with #1 to ARQ2: they were actively planning a space renovation or lighting upgrade or major repair prior to contact with the program.
- Responded with #2 to ARQ3: they would have done a full system change out within a year of when they installed the new equipment under the program.
- Scored N5b an 8, 9, or 10: they would have been very likely to have done the project at the same time as they did.
- Responded with #5 to N6: they would have done the same thing they would have done as they did through the program.

Based on these questions, we reclassified six customers as being NR.

Other questions that we analyzed to help validate the decision to reclassify these customers as NR, but were not explicitly used, include:

AA3a. Had the equipment that you replaced reached the end of its useful life?

1. Yes
2. No
88. Refused
99. Don't know

N2. Did your organization make the decision to install this new equipment before, after, or at the same time as you became aware of the rebates?

1. Before
2. After
3. Same time
88. Refused
99. Don't know

N6aa. Would you have [FILL IN RESPONSE TO N6 for N6 = 1, 2, 3, 5] at the same time as you did under the program, within a year, or at a later time?

1. Same time
2. Within one year
3. At a later time
88. Refused
99. Don't know

From these additional questions, we noted the following:

- AA3a: Four of the six respondents said their equipment that they replaced had reached the end of its useful life (the other two respondents were not asked this question due to skip patterns).
- N2: All six respondents said their organization made the decision to install this new equipment before they became aware of the rebates.
- N6aa: Five respondents would have done the same thing as they did under the program at the same time, and one within one year.

Finally, we examined the NTGR for these six participants to see what kind of influence the program had on their decision to install energy-efficient equipment. We found these six participants all had NTGRs of 0.35 or less. Furthermore, these participants had six of the eight lowest NTGRs. Therefore, the NTGRs scores were consistent with the decision to classify these participants as NR.

It is important to note that the Group D evaluation team, which evaluates custom projects, plans to use the evaluation NTGRs for classifying projects as NR or AR. For a project to remain AR after evaluation, the NTGR must be greater than 0.5. In addition to these six participants, there are two others that have NTGRs less than 0.5 and two that have NTGRs at exactly 0.5. Therefore, these four additional projects could have been reclassified as NR had we applied the Group D methodology.

4.4.2 HOU and Demand Coincidence Factors

As mentioned in Section 4.2, after verifying installation quantities, we used the survey responses for interior lighting HOU and operation patterns to estimate site-specific lighting hours of use.[48] This is the primary parameter for calculating annual energy savings. On average, we found that actual HOU are lower than the DEER numbers automatically populated in the MLC. Similarly, the evaluated peak period coincidence factors, which inform peak demand savings, are lower than their DEER counterparts. If the differences were higher

[48] This analysis is identical to that used and extensively described in the *Final Impact Evaluation, Nonresidential Lighting Sector Program, Program Year 2020*. See pp. 5–6.

than 25%, then we adjusted the MLC inputs with the evaluated values.[49] Table 11 shows a comparison between the DEER and evaluated averages for these parameters.

Table 11. Comparison Between DEER and Evaluated HOU and CDF for Custom Interior Lighting

Interior Lighting Adjustments	Number of Sites	Annual Operating Hours		Coincidence Factor	
		DEER	Evaluated	DEER	Evaluated
Sites Adjusted	29	2,688	2,011	0.343	0.258
Sites Not Adjusted	3	2,668	2,888	0.397	0.416
All	32	2,686	2,099	0.350	0.277

We did not collect sufficient information to perform a similar comparison between actual HOU for exterior lights and the default DEER value of 4,100 hours. We therefore relied on the DEER value for these cases.

4.4.3 Lifecycle Savings Calculation for AR Measures

MCE reported all custom and deemed LED installations rebated through the Commercial Upgrade program as AR projects. For AR measures, there are two sets of relevant annual savings:

- First baseline savings—the savings achieved by replacing the existing measure (T8, T12, HID, etc.) with the new LED. Projects achieve these annual savings over the number of years in which the removed measure would have still been viable, and account for the "acceleration" of their replacement under program influence (five years for most installations).
- Second baseline savings—at the end of the period in which the old measure would still have been viable (five years), a new lighting measure becomes necessary. LEDs are currently "standard practice," so MCE's Commercial Upgrade program can continue to claim energy savings for additional years only if the rebated LEDs continue to be more efficient than the lowest-efficiency (standard practice) lighting measures available on the market.
  - For custom lighting measures, second baseline savings are an MLC output. They vary based on each individual measure installed and are significantly lower than first baseline savings. Unfortunately, in PY2021, the program claimed second baseline savings as a constant fraction of 81.9 percent of first baseline savings, which significantly overstates annual savings for the remaining seven years of the LED measures.
  - For deemed measures, second baseline savings are equal to zero, because the old electronic ballast is no longer viable once the initial five years have elapsed. If a program participant replaces the entire fixture, they discard the TLEDs even if these are still functional. Unfortunately, in PY2021 the program claimed second baseline savings for deemed TLEDs as a constant fraction of 60 percent of first baseline savings, thus continuing to claim savings for seven years beyond the measure life stipulated in Workpaper SWLG009-02.

The guidance for calculating the EUL of custom LED measures is to use the maximum of 12 years, or 50,000 hours rated life, and divide this by the annual HOU. All custom projects claimed 12-year EULs. The evaluation found two sites for which the evaluated HOU exceeded 4,166 hours. These two sites had evaluated EULs of less than 12 years.

[49] The 25% difference threshold is like the one in the *2019 Custom Measure Evaluation* and is based on the uncertainty surrounding the on-site adjustment factors in the HOU analysis.

For AR measures, the guidance for calculating the remaining useful life of the measure removed is one-third of the life of the original measure.[50] As documented in the MLC calculators, all measures removed (T8, T12, T5 fluorescent lamps, or HID exterior lamps) had 15 years rated life. Their remaining life is therefore 5 years.

The deemed measures reported by the program are all TLED lamps, which are LED lamps that can function with the electronic ballast from the existing T8 fluorescent fixtures. Workpaper SWLG009-02, which was in effect in 2021, stipulates a five-year remaining life and a five-year total life for the TLED measures. This is the remaining life of the electronic ballast for the existing fixture into which program participants install the TLEDs.

4.4.4 Gross Evaluation Results

To estimate evaluated savings, we adjusted the MLC model inputs for each site using the verified measure application type (NR instead of AR, where applicable) and the evaluated HOU and coincidence factors for interior lighting, where applicable.

The adjusted MLC calculators provided first and second baseline savings, which we used to calculate evaluated first year and lifecycle savings. We compared these with the engineering savings that MCE claimed to develop site-specific ratios of evaluated-to-claimed gross savings (e.g., GRRs).

Using statistical analysis (case weights based on sample and total lighting savings), we generated population-level average GRRs by measure type. We present these in Table 12; they are applicable to all lighting projects the program claimed in PY2021.

Table 12. GRRs and Relative Precision (RP) for LED Lighting Measures Claimed Under MCE's PY2021 Commercial Upgrade Program

2021 Lighting Measure Type	Number of Sites (n)	First Year Savings (kWh)		First Year Demand Reduction (kW)		Lifecycle Savings (kWh)		Lifecycle Demand Reduction (kW)	
		GRR	RP	GRR	RP	GRR	RP	GRR	RP
Custom Interior	31	0.75	0.06	0.86	0.22	0.40	0.06	0.46	0.21
Custom Exterior	22	0.73	0.23	-	-	0.40	0.21	-	-
Deemed	6	1.00	0.00	1.00	0.00	0.45	0.00	0.45	0.00

First year GRR results are on the order of 0.75 and reflect the changes in measure type classification for six of the 40 projects evaluated, plus any adjustments for interior lighting HOU and coincident factors as described above. We verified first year savings for deemed measures to be correct as claimed.

In addition to adjustments for the first year savings calculations, lifecycle savings also use the correct (MLC-generated) second baseline savings. As we mentioned earlier, MCE significantly overestimated second baseline savings for both custom and deemed measures, and thus overstated lifecycle savings claims. Evaluated lifecycle savings also use any evaluation-based updates to EUL (based on actual HOU) and RUL (five years for all projects, whereas MCE claimed four years). The overall lifecycle GRR is on the order of 0.40.

To illustrate the magnitude of the second baseline and EUL/RUL adjustments, we developed intermediate savings to compare MCE claimed savings with the savings available from the MLC calculators as provided in the project folders. As Figure 4 Figure 4 illustrates, the ratio between the correct MLC-based intermediate savings (the "correct MLC engineering savings") and the claimed engineering savings quantifies the effect of MCE's using a fixed percent of savings in the second baseline as well as an RUL of 4 years—rather than the correct savings available in the MLC and the correct RUL. Then, the ratio between the evaluated MLC savings

[50] CPUC, *Statewide Custom Project Guidance Document*, version 1.4, 2021, p. 11, https://file.ac/OEr-2p-bk3A/.

and the correct MLC-based intermediate savings quantifies only the evaluation-based edits to the MLC (NR instead of AR, etc.). The evaluated-to-claimed ratio is equal to the product of the two intermediate ratios.

Figure 4. Equations Used to Develop the Evaluated-to-Claimed Savings Ratio

$$\frac{\text{Correct MLC Engineering Savings}}{\text{Claimed Engineering Savings}} = \text{Correct-to-Claimed Ratio} \qquad \frac{\text{Evaluated MLC Savings}}{\text{Correct MLC Engineering Savings}} = \text{Evaluated-to-Correct Ratio}$$

$$\text{Correct-to-Claimed Ratio} \times \text{Evaluated-to-Correct Ratio} = \text{Evaluated-to-Claimed Ratio}$$

Table 13 shows that MCE claimed first year savings that generally follow MLC calculator outputs. The evaluated-to-claimed First Year GRRs reflect only the evaluation adjustments.

Table 13. First Year Savings and GRRs—Stepped-Process Results for the PY2021 Commercial Upgrade Program

2021 Lighting Measure Type	Number of Sites (n)	Gross MWh		Corrected-to-Claimed Ratio	Gross MWh		Evaluated-to-Claimed Ratio (GRR)
		Claimed Engineering Savings	Correct MLC Savings		Evaluated Savings	Evaluated-to-Claimed Ratio	
Custom Interior	31	537	549	1.02	400	0.73	0.75
Custom Exterior	22	677	677	1.00	496	0.73	0.73
Deemed	6	19	19	1.00	19	1.00	1.00

Table 14 shows that, by claiming lifecycle savings based on a fixed percent of savings in the second baseline and 4 years RUL, MCE overreported lifecycle savings by a factor of two. When we compare to the original MLC outputs (which MCE should have used to claim savings), evaluation adjustments alone account for lifecycle realization rates (the ratio of the evaluated savings value to the corrected claimed savings value) on the order of 0.75. This is similar to the First Year GRRs.

Table 14. Lifecycle Year Savings and GRRs—Stepped-Process Results for the PY2021 Commercial Upgrade Program

2021 Lighting Measure Type	Number of Sites (n)	Gross MWh		Corrected-to-Claimed Ratio	Gross MWh		Evaluated-to-Claimed Ratio (GRR)
		Claimed Engineering Savings	Correct MLC Savings		Evaluated Savings	Evaluated-to-Claimed Ratio	
Custom Interior	31	5,662	3,039	0.54	2,264	0.75	0.40
Custom Exterior	22	7,143	3,756	0.53	2,862	0.76	0.40
Deemed	6	205	93	0.45	93	1.00	0.45

The claimed savings from Table 13 and Table 14 are the "engineering" values calculated, which do not include the 0.9 realization rate adjustment as the original Commercial Upgrade program gross claims do (i.e., the engineering values are the original gross claim values divided by 0.9). These values are directly comparable with the MLC outputs for both the original models and the adjusted evaluation versions. We mean for the GRRs in Table 15 to reflect actual conditions and to be the counterparts of the usual 0.9 RR value.

It is important to note that MCE's claims for PY2022 follow the same patterns observed in PY2021: they include second baseline savings set as a fixed percent of first year baseline savings, incorrect EUL and RUL values for the deemed measures, and an incorrect RUL of 4 years for the custom measures. PY2022 custom claims will be subject to Group D (custom) evaluation. We advise MCE to adjust the reported parameters and savings for deemed and custom lighting measures before the PY2022 claims become final in May 2023.

Table 15 presents the population-level first year gross MWh and MW realization rates for the evaluated lighting measures, along with the aggregate claimed and evaluated first year MWh and MW savings. We included the

engineering version of reported savings (without the 0.9 custom realization rate) in the table because the evaluation GRRs are the ratio between the evaluation savings and the "engineering" reported savings.

Table 15. First Year Gross MWh and MW Savings and Realization Rates for PY2021 Commercial Upgrade Lighting Measures

2021 Lighting Measure Type	First Year Gross MWh					First Year Gross MW Savings				
	Claimed	Claimed Engineering	Evaluated	GRR	Sample RP	Claimed	Claimed Engineering	Evaluated	GRR	Sample RP
Custom Interior	886	985	735	75%	6%	0.1	0.1	0.1	86%	22%
Custom Exterior	1,064	1,182	865	73%	23%	0.0	0.0	0.0	0%	0%
Deemed	19	19	19	100%	0%	0.0	0.0	0.0	100%	0%

As we discussed above, first year GRRs essentially reflect the evaluation-based adjustments of measure type (AR to NR) and interior lighting HOU and coincidence factors. We found deemed claims to be correct and not needing adjustments.

Note that demand savings for exterior measures have zero evaluated values. In general, kW savings for exterior lighting measures (excluding covered parking lots) are not associated with peak demand savings because these lights tend to be switched on after the peak period has concluded. MCE claimed nonzero kW and therms savings for exterior lighting for two projects outside our completed sample of 40. We had access to the MLCs for these and found that the measures had been incorrectly entered as "common area lighting" even though photographs show the lamps are installed outside. The correct savings are zero.

Table 16 presents the population-level lifecycle gross MWh and MW realization rates for the evaluated lighting measures, along with the aggregate claimed and evaluated lifecycle MWh and MW savings.

Table 16. Lifecycle Gross MWh and MW Savings and Realization Rates for PY2021 Commercial Upgrade Lighting Measures

2021 Lighting Measure Type	Lifecycle Gross MWh					Lifecycle Year Gross MW Savings				
	Claimed	Claimed Engineering	Evaluated	GRR	Sample RP	Claimed	Claimed Engineering	Evaluated	GRR	Sample RP
Custom Interior	9,353	10,393	4,156	40%	6%	1.1	1.2	0.6	46%	21%
Custom Exterior	11,194	12,438	4,983	40%	21%	0.1	0.1	0.0	0%	0%
Deemed	205	205	93	45%	0%	0.0	0.0	0.0	45%	0%

As explained above, in addition to the adjustments reflected in the first year GRRs, lifecycle GRRs also reflect the corrections to second baseline savings and RUL, and any updated EUL values for interior lighting. Second baseline and EUL adjustments also affect lifecycle savings for the deemed measures.

4.5 Net Impacts

The net impact methodology involves a two-step process:

- First, we estimate an NTGR for sampled projects we evaluate through analysis of surveys.

- Second, we develop an NTGR estimate for the population by extrapolating from the sampled projects to the entire population sample frame.[51]

Over the last several evaluation cycles, the NTG analysis for nonresidential programs used a standardized Self-Report Approach (SRA) [52] that is based on the results of self-report telephone surveys with program participants and has been in place since the PY2006–PY2008 evaluation cycle. This evaluation continues the use of this standard SRA framework with updates developed during PY2018 through a collaborative process by both the Group A and Group D evaluation teams. The net-to-gross scoring methodology in place since PY2018 has an expanded framework to address both downstream and midstream programs. Group D is currently expanding on this methodology—however, their final survey questions and scoring algorithms were not available at the time we completed this analysis.

This SRA methodology provides a standard framework, including decision rules, for integrating findings from both quantitative and qualitative information in the calculation of the NTGR in a systematic and consistent manner. The question structure more accurately reflects the complex nature of real-world decision-making and helps to ensure that all nonprogram influences are in consideration when we assess the unique contribution of the program to the energy efficiency project's implementation. Rather than focusing only on the respondents' rating of the program's importance, we ask respondents to jointly consider and rate the importance of the many likely events or factors that may have influenced their energy efficiency decision-making for the project in question. The method uses a 0 to 10 scoring system for key questions used to estimate the NTGR, rather than using fixed categories with assigned weights.

4.5.1 NTG Approach

The SRA methodology for downstream programs consists of an average of three components, termed program attribution indices (PAI), and referred to as PAI-2, PAI-3, and PAI-N6. Note that the evaluation team dropped the PAI-1 score in the PY2017 evaluation and subsequently added the PAI-N6 score in the PY2018 evaluation.[53] We score these indices from participant survey responses about the decision to install a program measure.

The score PAI-2 captures the perceived importance of the program (incentive, recommendation, audit, or other program intervention) relative to nonprogram factors in the decision to implement the specific measure that the customer eventually adopted or installed. The evaluation team determined this score by asking respondents to assign importance values to both the program and most important nonprogram influences, so that the two values total 10. If respondents say they had already made their decision to install the specific program-qualifying measure before they learned their project was eligible for program rebates, then we reduce the program influence score by half.

We ask the following questions to estimate PAI-2:

- N2. Did your organization make the decision to install the new energy-efficient equipment before, after, or at the same time as you became aware that rebates were available through the PROGRAM?

[51] Please note that the 0.05 market effects adder is not included in the NTGR discussed in this section. The market effects adder is, however, included in the final ex post net savings values we present in the Executive Summary and Section 4.5.2. We define the NTGR as one minus free ridership here and in the following section where we discuss the NTGR estimated for the SFDI program.
[52] The statewide Nonresidential NTG working group originally developed this SRA framework during PY2008.
[53] For a detailed discussion on the reasoning for replacing this index, please refer to the PY2018 report submitted to the CPUC: http://www.calmac.org/publications/2018_Nonresidential_ESPI_Deemed_Lighting_Impact_Evaluation_-_Final_Report_and_Appendices.pdf.

- N41. How many of the ten points would you give to the importance of the PROGRAM in your decision?
- N42. And how many points would you give to all of these other nonprogram factors?

We calculate the PAI-2 score using Equation 1.

Equation 1. PAI-2

$$if\ N2 = Before$$

$$then\ PAI2 = \frac{N41}{2}$$

$$else\ PAI2 = N41$$

The score PAI-3 captures the likelihood of various actions the customer might have taken at the time of project decision-making, and in the future, if the program had not been available (the counterfactual). We ask the following questions to estimate PAI-3:

- N5. Using a likelihood scale from 0 to 10, where 0 is not at all likely and 10 is extremely likely, if the PROGRAM had NOT BEEN AVAILABLE, what is the likelihood that you would have installed exactly the same program-qualifying equipment that you did for this project regardless of when you would have installed it?
- N5aa. Using a likelihood scale from 0 to 10, where 0 is not at all likely and 10 is extremely likely, if THE PROGRAM had NOT BEEN AVAILABLE, what is the likelihood that you would have installed exactly the same energy-efficient equipment at the same time as you did?

We calculate the PAI-3 score using Equation 2.

Equation 2. PAI-3

$$PAI3 = 10 - MAX(N5, N5aa)$$

The score PAI-N6 captures a more specific action the respondent would have taken if the program had not been available. The action taken by the respondent gives an indication of the level of influence the program has on the customer. For instance, if the customer indicates that without the program, they would have installed equipment of lower efficiency or quantity, this indicates that the program has a degree of influence on energy savings. If, however, the customer indicates that without the program they would have kept their previous equipment, this indicates that the program has completely influenced energy savings. If the respondent indicates that without the program, they would have repaired the existing equipment, then PAI-N6 is set to 10. This is because it is most likely that by repair, the respondent means replacing a bulb or less likely a ballast, and that a full system change out would be highly unlikely in the absence of the program. We ask the following questions to estimate PAI-N6:

- N6. Now I would like you to think one last time about what action you would have taken if the PROGRM had not been available. Which of the following alternatives would you have been MOST likely to do?

1. Installed/Delamped fewer units (go to N6a)
2. Installed standard efficiency equipment or whatever was required by code
3. Installed equipment more efficient than code but less efficient than what you installed through the program
4. Done nothing (keep existing equipment as it is)

5. Done the same thing I would have done through the program
6. Repair/rewind overhaul the existing equipment
77. Something else (Specify: _____)
88. Refused
99. Don't know

- N6a. How many fewer units would you have installed? (Respondent can give an answer such as "half", "10 percent fewer", etc.)

We base the PAI-N6 score on the score rationale shown in Table 17.

Table 17. N6 Scoring Rationale

Criteria	PAI-N6 Score	Score Rationale
$if\ N6 = 1$	Then PAI-N6 = 10*% units installed due to program (N6a)	If the customer would have installed fewer units without the program, we score them with partial credit as being a net participant, proportional to the percentage of fewer units they would have installed.
$if\ N6 = 2\ OR\ N6 = 4$	Then PAI-N6 = 10	If the customer would have done nothing or installed equipment of baseline efficiency, we score them as a net participant.
$if\ N6 = 3$	Then PAI-N6 = 7.5	If the customer would have installed more efficient equipment than code, but less than what they installed under the program, they get partial credit as being a net participant. We give a score of PAI-N6 = 7.5 based on evaluator judgement, as we do not know specifics about what the customer would have installed.
$if\ N6 = 5$	then PAI-N6 = 0	If the customer would have taken the same action as under the program, we score them as a free rider.
$if\ N6 = 6$	then PAI-N6 = 10	If the customer would have repaired the existing equipment, we score them as a net participant.
$if\ N6 = 77$	We review the response and provide a score based on judgment, frequently a 0 or 1	If the customer provides another response, we review the response and develop a score based on that response.

When there is missing data or "don't know" responses to critical elements of each score described above, then we do not use that PAI component in the NTGR. As long as there are at least two valid PAI scores, then we set the overall NTGR equal to the average of these valid scores, divided by 10. If we can only obtain one or no valid PAI scores, then the NTGR is set to "missing."

4.5.2 Net Impact Results

Table 18 presents the ex post NTGRs we developed for the evaluated sample of projects using the above methodology.

Table 18. Claimed and Evaluated NTGRs for Lighting Measures Rebated through MCE's PY2021 Commercial Upgrade Program

2021 Lighting Measure	NTGR		
	Reported	Evaluated	Evaluated RP
Custom Interior	0.91	0.68	9%
Custom Exterior	0.91		
Deemed	0.60		

The 0.68 evaluated NTGR is much lower than the 0.91 value MCE claimed for the custom lighting measures and is higher than the 0.60 value MCE claimed for the deemed lighting measures, comprised of 4-foot LED T8 UL Type A lamps replacing linear fluorescent T8 lamps.

Table 19 presents the ex ante and ex post NTGRs for the evaluated lighting measures, with the 0.05 market effects adder.[54]

Table 19. Ex Ante and Ex Post NTGRs for Lighting Measures Rebated through MCE's PY2021 Commercial Upgrade Program with Market Adder

2021 Lighting Measure	NTGR	
	Reported	Evaluated
Custom Interior	0.96	0.73
Custom Exterior	0.96	
Deemed	0.65	

Table 20 presents the population level first year MWh and MW net realization rates for the evaluated lighting measures, along with the aggregate ex ante and ex post first year net MWh and MW savings. The net realization rate reflects both the differences in ex ante and ex post gross savings, and with different ex ante and ex post NTGRs.

Table 20. First Year Net MWh and MW Realization Rates for Lighting Measures Rebated through MCE's PY2021 Commercial Upgrade Program

2021 Lighting Measure	First Year Net MWh Savings			First Year Net MW Savings		
	Ex Ante	Ex Post	NRR	Ex Ante	Ex Post	NRR
Custom Interior	851	534	63%	0.1	0.1	72%
Custom Exterior	1,021	629	62%	0.0	0.0	0%
Deemed	12	14	112%	0.0	0.0	112%

The first year MWh net realization rate is on the order of 0.63 for custom measures, meaning that the evaluation could verify only 63% of MCE's claimed net savings for these measures. For deemed lighting, the first year net realization rate is 1.12 and is a direct result of the evaluated net-to-gross ratio being higher than the deemed net-to-gross ratio.

The lifecycle MWh net realization rate for custom measures is on the order of 0.34, and it is 0.51 for deemed measures (Table 21). Both results reflect gross adjustments to the lifecycle savings calculations and net adjustments to the level in which the Commercial Upgrade program influenced measure installations.

[54] We include the 0.05 market effects adder in the final ex post net savings values in the Executive Summary and in the tables in this section where noted.

Table 21. Lifecycle Net MWh and MW Realization Rates for Lighting Measures Rebated through MCE's PY2021 Commercial Upgrade Program

2021 Lighting Measure	Lifecycle Net MWh Savings			Lifecycle Year Net MW Savings		
	Ex Ante	Ex Post	NRR	Ex Ante	Ex Post	NRR
Custom Interior	8,979	3,020	34%	1.1	0.4	38%
Custom Exterior	10,746	3,621	34%	0.1	0.0	0%
Deemed	133	68	51%	0.0	0.0	51%

4.6 Commercial Upgrade Program Findings and Recommendations

4.6.1 Findings

Below are the key findings we identified by conducting this evaluation of the Commercial Upgrade program. These results are based on the 40 participant telephone surveys we conducted as part of this evaluation and the review we performed on program tracking data and project documentation.

Installations

Nearly all customers confirmed that they installed the lighting measures and quantities reported in the program tracking data. We verified that the quantities reported match those used in the MLC savings calculator. We found a data entry error in one MLC, which we corrected.

MCE reported all lighting projects installed through the Commercial Upgrade program as AR projects, meaning the customer installed the LEDs offered by the program while their old lights were still viable. Based on survey responses, six participants indicated that their old lights were failing or that they were actively planning a lighting upgrade and would have done the same lighting upgrade in the absence of the program. We reclassified these six cases as NR projects. NR projects have lower energy savings because the savings are calculated from industry standard practice efficiency levels, rather than from the efficiency levels of the replaced measure.

Operating Hours and Measure Life

Overall, we found lower operating hours than the DEER numbers automatically populated in the MLC based on facility type and location. Lower operating hours lead to lower energy savings.

The guidance for calculating the EUL of custom LED measures is to use the maximum of 12 years or 50,000 hours rated life divided by the annual HOU. All custom projects claimed 12-year EULs. The evaluation found two sites for which the HOU exceeded 4,166 hours. The evaluated EULs for these two sites were lower than 12 years.

For AR measures, the guidance for calculating the remaining useful life of the measure removed is one-third of the life of the original measure.[55] As documented in the MLCs, all measures removed (T8, T12, T5 fluorescent lamps, or HID exterior lamps) had 15 years rated life. Their remaining life is therefore five years, not four years, as claimed in the program tracking data. Higher RUL values lead to increased energy savings.

The deemed measures reported by the program are all TLED lamps, which are LED lamps that can function with the electronic ballast from the existing T8 fluorescent fixtures. Workpaper SWLG009-02, which was in

[55] CPUC, *Statewide Custom Project Guidance Document*, version 1.4, 2021, p. 11, https://file.ac/OEr-2p-bk3A/.

effect in 2021, stipulates a five-year remaining life and a five-year total life for the TLED measures. This is the remaining life of the electronic ballast for the existing fixture into which the TLEDs are installed. The Commercial Upgrade program claimed a total measure life of 15 years and a remaining life of 5 years for the deemed TLED measures, which significantly overstates lifecycle savings.

Savings Estimates

For AR measures, there are two sets of relevant annual savings: first baseline and second baseline savings.

For custom lighting measures, second baseline savings are an MLC output. They vary based on each individual measure installed and are significantly lower than first baseline savings. Unfortunately, in PY2021, the program claimed second baseline savings as a constant fraction of 81.9 percent of first baseline savings, which significantly overstates annual savings for the remaining seven years of the LED measures.

For deemed measures, second baseline savings are equal to zero, because the old electronic ballast is no longer viable once the initial five years have elapsed. If a program participant replaces the entire fixture, they discard the TLEDs even if these are still functional. Unfortunately, in PY2021, the Program claimed second baseline savings for deemed TLEDs as a constant fraction of 60 percent of first baseline savings, thus continuing to claim savings for seven years beyond the measure life stipulated in Workpaper SWLG009-02.

Program Influence

For the most part, we found that the program was fairly influential in customers' decisions to install LED lighting measures. Overall, the evaluated NTG ratio was 0.73. This is significantly lower than the reported NTG value of 0.96 for custom lighting measures, but it is somewhat higher than the value of 0.65 for the deemed lighting measures.

4.6.2 Recommendations

Based on the evaluation and conclusions above, we present the following recommendations to MCE for the Commercial Upgrade program:

- Installations
  - Probe AR conditions as reported by the implementers prior to claiming savings. Projects where equipment has reached the end of its useful life, or where the customer was planning a lighting project in the very near future, should not be claimed as "early replacement."
- Savings Calculations
  - Rely on the MLC for the correct second baseline savings for all custom measures. Using a flat 81.9 percent of the first baseline savings caused MCE to significantly overstate gross lifecycle savings.
  - Use the correct RUL for custom measures. Using an RUL of four instead of the correct five years caused the lifecycle calculation to underestimate lifecycle savings for the RUL of the measure removed.
  - Use the correct EUL/RUL and second baseline for deemed measures. Workpaper SWLG009-02 governs Type A TLED installations. Failure to follow the workpaper guidelines caused MCE to significantly overstate gross lifecycle savings.
  - These issues continue in PY2022, as we have thus far observed in the program tracking data. PY2022 custom claims will be subject to Group D (custom) evaluation. We advise MCE to adjust

the reported parameters and savings for deemed and custom lighting measures before the PY2022 claims become final in May 2023.

- Operating hours and peak coincidence factors were found to be lower than the current DEER estimates and should be considered for future updates to the DEER lighting hours and the Modified Lighting Calculator (MLC) which incorporates the DEER values.

5. Evaluation of SFDI and Multifamily Programs

The evaluation team focused on two residential programs offered by MCE: SFDI and Multifamily. These programs jointly contributed 7% of claimed lifecycle gross kWh energy savings and less than 5% of lifecycle gross therm savings from projects completed in PY2021 (see Figure 1). Because the SFDI and Multifamily programs contributed relatively small shares to MCE's PY2021 portfolio savings, the evaluation team and CPUC agreed to an ex ante review and correction of first year gross savings claims. The primary objective of the ex ante review is to determine whether MCE's tracking system contains the correct energy savings estimates and related impact parameters for the SFDI and Multifamily program measure claims. For this activity, we focused on deemed energy savings and did not review Custom (or calculated) savings.

We also implemented telephone surveys of SFDI and Multifamily program participants to gather data on free ridership and to support the development of evaluated net savings. We gathered sufficient data to estimate free ridership for the SFDI Program, which we applied to the corrected SFDI savings claims in Section 5.1. This provides us with a partially evaluated net first year savings for the SFDI Program.

We could not estimate free ridership for the Multifamily Program because we only reached one of the four customers who participated in 2021. We made at least six attempts to reach the property managers and owners of participating multifamily locations by leaving voicemails at different times of day and sending emails using different subject lines. The one responding participant completed projects that represented 18% of claimed first year gross energy savings. We therefore do not present net savings for the Multifamily Program.

The remainder of this section includes brief descriptions of these programs, along with changes that were made to them in PY2021. We follow these items with a description of our ex ante review methodology, the corrected first year gross savings claims for the SFDI and Multifamily programs, and a discussion of the free ridership analysis we carried out. At the end, we present the first year net savings results for the SFDI Program.

SFDI

The SFDI program offers home energy assessments, installation of measures provided in energy savings kits, and home upgrades to customers who reside in single-family dwellings. This program targets customers in Disadvantaged Communities (DACs) whose households have incomes that exceed the limit allowing them to receive services through MCE's low-income targeted programs, such as its Low Income Family and Tenants (LIFT) pilot. The SFDI program relies on a Single Point of Contact (SPOC) model and is a gateway program that encourages customers to identify additional energy efficiency opportunities in their homes. The program also provides customers with energy education resources to help them understand how installed measures can help reduce energy use in their homes. Measures that have been installed through the program include faucet aerators, efficient showerheads, smart thermostats, pipe wrap, and furnaces. According to MCE, the SFDI program expanded the list of measures provided through the program in 2021 to include heat pump water heaters, heat pumps, duct sealing, and attic insulation.

Multifamily

The Multifamily program targets low-income and market rate residents and owners of multifamily buildings in MCE's service territory. Through its implementer, the Association for Energy Affordability (AEA), MCE offers customized no-cost property assessments, project scope development, and technical assistance throughout the lifetime of the projects carried out under this program. The program provides owner rebates and direct installation for a set of EE measures specifically tailored for multifamily properties, including measures that forward building electrification. In 2021, the Multifamily program provided rebates to four properties for LED

common area and exterior lighting, ENERGY STAR® freezers and refrigerators, faucet aerators, and a domestic hot water demand control heat pump. Table 22 summarizes the number of properties that received the different measures rebated through the program.

Table 22. Measure Types Installed at Multifamily Properties Participating in Program in 2021

Property Number	Measures Installed					Number of Measure Types Installed
	Domestic HW Demand Control Heat Pump	Common Area & Exterior LED Lighting	ENERGY STAR Freezers	ENERGY STAR Refrigerators	Faucet Aerators	
1	✓	✓	✓			3
2		✓				1
3		✓				1
4		✓		✓	✓	3

The Multifamily Program aims to serve vulnerable communities that may not traditionally benefit from EE programs offered in California. The program offers multifamily property owners the opportunity to upgrade their buildings and renters the change to occupy energy-efficient units, which helps them save on their electric bills. In 2021, the Multifamily program layered incentives with the LIFT pilot "by providing funding to affordable properties where not all units qualify for LIFT incentives."[56] MCE completed four projects in 2021.[57]

5.1 Ex Ante Review

For the ex ante review, the evaluation team reviewed MCE's SFDI and Multifamily deemed measure claim submissions to CEDARS with the complete PY2021 claim data in CEDARS. Additionally, the team compared the claim measures against the approved values in the eTRM. We completed this analysis to develop corrected claimed first year gross savings. This analysis involved systematically assigning each claim record to its corresponding record in the eTRM, performing a comparison of the two, and tracking issues encountered throughout the process. We engaged in this effort to:

- Help the eTRM and CEDARS teams identify areas for improvement that would allow PAs to claim approved measures more readily;
- Help MCE identify claims discrepancies in CEDARS and/or in MCE's program tracking data to ensure claims of appropriate values moving forward; and
- Provide summaries that compare the ex ante claims against approved eTRM values.

The result of this analysis produced corrected ex ante first year gross savings and demand reduction claims, which we alternatively refer to as "eTRM mapped" or "corrected" claims.

Methodology

A detailed description of the methodology we used to review and revise MCE's deemed 2021 claims associated with its SFDI and Multifamily programs is included in Appendix D, as the details are of most interest to primarily technical data staff with detailed knowledge of CEDARS claims, the eTRM, and their respective

[56] MCE, "2021 MCE Energy Efficiency Annual Report" (2022). https://www.mcecleanenergy.org/wp-content/uploads/2022/06/MCE-2021-Energy-Efficiency-Report_06012022.pdf
[57] Ibid.

data specifications. We do provide a summary of the steps the evaluation team took to develop corrected claimed first year savings values below.

Checking the accuracy of MCE's 2021 SFDI and Multifamily programs claim data entailed matching each claim record to a record in the eTRM measure permutations data. Because these are deemed programs, all parameters claimed in CEDARS should match the parameters associated with a corresponding approved deemed measure stored in the eTRM. Matching the MCE claim data with the eTRM data was not a straightforward exercise and required the evaluation team's deep experience with PA claim data. The mismatches were largely a result of either (1) valid combinations of parameters that were claimed but were not available in the eTRM or (2) the potential that MCE is claiming invalid combinations of parameters that are purposefully not available in the eTRM. An exhaustive analysis of every mismatch was not in the scope of this task; however, we outline the prevailing issues below.

After iteratively adjusting and matching primary keys, we successfully aligned all deemed SFDI and MF claims included in this review with the eTRM. This allowed for the direct comparison of the claim and eTRM data. Starting in 2022, a new field was added to the claim data that should make alignment to the eTRM much more straightforward. The long-term plan of the DEER ex ante team is to have CEDARS check the claims versus eTRM measure permutations, and adding this field is a first step toward that goal.

Rules for Fuel Substitution Single-Fuel Conversion

The Cost Effectiveness Tool (CET)/CEDARS implements ED's policy on fuel substitution. This occurs in claims, filings, and in the CET User Interface (CET_UI) runs, as explained in detail in the CET User Guide and briefly here.[58] Please note that the fuel substitution post-processing outlined below is completed after a claim is submitted. For the purposes of this analysis, we compared the eTRM values against the claim values prior to the fuel substitution post-processing so that we have an apples-to-apples comparison.

Post processing for fuel substitution operates as follows:

- The CET_UI identifies fuel substitution measures using the MeasImpactType field. Values from the MeasImpactType value list ending with 'FuelSub' specify a fuel substitution measure.
- As specified in the "validation_rules.csv" file, fuel substitution measures require one or both of UnitkWh1stBaseline or UnitTherm1stBaseline to have positive values.
- The CET_UI only performs fuel substitution special handling on energy savings (kWh and therm). It does not perform special handling on other output parameters (e.g., Budget, Cost Effectiveness).
- Savings associated with fuel substitution measures are converted to single fuel:
  - If therm savings are positive, all savings convert to kWh, and therms are zeroed out.
  - If kWh savings are positive and therm savings are negative, all savings are converted to therms, and kWh are zeroed out.
- The following conversion factors are used:
  - 1 therm = 29.3 kWh

[58] The CET User Guide is accessible, with appropriate login credentials here: https://cedars.sound-data.com/cet_ui/cet-user-guide/

- 1 kWh = 0.03413 therms

Claims versus eTRM Data

In our analysis, we compare the pre-CET output values, allowing a direct comparison of claimed parameters against those provided in the eTRM. Both the claimed values and the eTRM values are pre-CET and pre-CEDARS fuel substitution single-fuel post-processing, and we are attempting to show the impact of aligning each claim record with an eTRM measure permutation record. So we limit the analysis to pre-CET-output values as well.

In Table 23, we present the 2021 claimed energy savings and peak demand reduction, the eTRM-mapped/corrected claim values, and the absolute difference in the values for the SFDI and Multifamily programs. The table separates the positive kWh savings from the negative kWh savings arising from fuel substitution measures for the programs to show the magnitude of the difference in positive and negative electric savings. For example, we see a 4% difference in negative kWh values for the SFDI program and a 5% difference when we compare the positive kWh savings. If we only looked at the combined kWh savings in the following row, we would see a smaller absolute difference in the original and corrected claims (e.g., 2%). By separating out the positive and negative kWh savings, we get a more nuanced understanding of how the original kWh claims differ from the corrected eTRM-mapped savings.

It is notable that, for SFDI, the difference in claimed and eTRM-mapped peak demand reduction is 28% in kW and is virtually nonexistent for therm savings.

Since there are no fuel substitution measures rebated under the Multifamily program, we only see the original claimed kWh savings value and the corrected eTRM value, both of which include only positive kWh savings. In this case, the difference in the original claimed gross kWh savings and the corrected value is much larger, 121%. The difference in peak demand reduction from the claimed to eTRM-mapped values is much larger, at 800%, though the overall size of the Multifamily reduction is in single digits. Our ex ante review of therm savings shows that the eTRM-mapped value is about 50% greater than the original claimed value.

Due to several fuel substitution measures rebated under the SFDI program, as well as significant gas-saving equipment claims, the corrected kWh savings claims for the SFDI program are approximately -9.5 MWh, which is the difference between the negative electric savings from fuel substitution (-42.8 MWh) and the positive electric savings (33.3 MWh). There are also small but positive electric savings for the Multifamily program, even though no fuel substitution measures were rebated (15.1 MWh).

In total, the SFDI and Multifamily programs contribute a claim corrected gross first year total of about 5.6 MWh and 28,786 therms to MCE's 2021 energy efficiency portfolio. The combined peak demand impact of the programs is 40 kW.

Table 23. MCE 2021 Total Annual Claimed vs. eTRM-Mapped/Corrected, First Year Gross Energy Savings and Peak Demand Reduction for Deemed Measures

Program	Energy Savings Unit	Quarterly Claims Data 2021 Annual	eTRM-Mapped/Corrected Quarterly Claims Data 2021 Annual	Absolute Difference
SFDI	kWh (negative, fuel sub)	-44,364	-42,772	4%
	kWh (positive)	35,114	33,309	5%
	Combined kWh	-9,250	-9,463	2%
	kW	43	31	28%
	therms	28,074	28,142	0%

Program	Energy Savings Unit	Quarterly Claims Data 2021 Annual	eTRM-Mapped/Corrected Quarterly Claims Data 2021 Annual	Absolute Difference
Multi-family	kWh (negative, fuel sub)	0	0	0%
	kWh (positive)	6,815	15,061	121%
	Combined kWh	6,815	15,061	121%
	kW	1	9	800%
	therms	423	644	52%
Total	kWh (negative, fuel sub)	-44,364	-42,772	4%
	kWh (positive)	41,929	48,370	15%
	Combined kWh	-2,435	5,598	330%
	kW	44	40	9%
	therms	28,497	28,786	1%

5.2 SFDI and Multifamily Net-to-Gross Analysis

This section details the data collection activities conducted by the evaluation team for the NTG analysis, NTG methodology, and NTG analysis results for MCE's SFDI and Multifamily programs.

5.2.1 Data Collection

SFDI Participant Survey

To collect data for NTG research, the evaluation team conducted a phone survey from August 31 to September 24, 2022 (see Appendix E for the SFDI phone survey instrument). As shown in Table 24, there was a total of 512 participants in 2021 and, of the 512, 92% made it into the sample for having a valid phone number and having received at least one energy-efficient measure from the SFDI program. Due to the small sample size, the evaluation team used a census approach to sampling. Nearly a tenth of the population (7%, N = 512) completed the survey after a maximum of 10 call attempts. The survey achieved a response rate of 11%.

Table 24. SFDI Participant Survey Sample Summary

Measure	Population		Sample		Survey	
	N Count	Percent[A]	n Count	Percent[A]	n Count	Percent[A]
Overall	**512**	**N.A.**	**472**	**92%**	**35**	**7%**
Measure-Level Sample Summary						
Low-flow Showerhead	451	88%	438	93%	23	66%
Low-flow Faucet Aerator	451	88%	439	93%	21	60%
Smart Thermostat	310	61%	294	62%	20	57%
Insulation	278	54%	266	56%	15	43%
Duct Sealing	228	45%	216	46%	7	20%
Pipe Wrap	129	25%	118	25%	1	3%
Heat Pump	31	6%	30	6%	1	3%
Water Heater	4	1%	4	1%	0	0%
Furnace	3	1%	3	1%	0	0%

[A] Percentage columns do not sum to 100% because participants received multiple measures.

Multifamily Participant Survey

For the Multifamily program NTG research, the evaluation team conducted a phone survey (see Appendix F for the Multifamily survey instrument). Notably, the Multifamily program had four participant properties with 355 residential units combined. The evaluation team sent invites and reminders by email and followed up with contacts multiple times by phone. One of four participants completed the survey. We could not reach another property contact at the scheduled time, and we could not reach the other two property contacts at all. This resulted in a response rate of 25%.[59]

5.2.2 NTG Approach

For SFDI and Multifamily NTG analysis, the evaluation team used the same survey design and NTG analyses we applied to residential measures in recent studies developed on behalf of the CPUC.[60] For the SFDI program, the evaluation team assessed two components of FR: (1) timing or duration over which implementers installed the energy efficiency equipment and (2) efficiency of the installed equipment. For the Multifamily program, the evaluation team attempted to assess three components of FR: (1) timing, (2) efficiency, and (3) the quantity or number of energy efficiency equipment installed. Since SFDI participants often receive the same quantity of a given measure (e.g., one smart thermostat, two kitchen faucet aerators, one showerhead, one furnace, etc.), we did not include the quantity component in the FR calculation for the SFDI program. For the Multifamily program, we considered the quantity component of FR in the methodology—the number of the measures installed may vary and may be decided upon by the property manager. Table 25 details the components of free ridership for the two different programs. Note that we attempted a census for both surveys. We achieved 40 SFDI survey completes and one Multifamily survey complete.[61]

[59] While the response rate is high, the sample size for the Multifamily program phone survey is very small (N = 4).

[60] We reviewed the NTG batteries included in several residential energy efficiency impact evaluations including: The Cadmus Group, *Residential Retrofit High Impact Measure Evaluation Report,* prepared for the CPUC. February 8, 2010; DNV-GL, *Impact Evaluation Report—Residential HVAC Sector—Program Year 2019*, prepared for the CPUC. March 17, 2021; and DNV-GL and Apex Analytics, *2013–2014 Residential Roadmap: Multifamily Focused Impact Evaluation*, prepared for the CPUC.

[61] Since there were only four customers who participated in the Multifamily program in 2021, a professional interviewer attempted to reach these customers by both email and telephone. We made more than 7 attempts for each customer, which entailed sending emails to multiple contact email addresses and calling the customers on different days of the week and at different times. Even with our attempts, we could only achieve one complete interview.

Table 25. Free Ridership Components

Free Ridership Component	Survey Question	Response	Free Ridership Score
SFDI Free Ridership Components			
Timing (FR_t)	FR4b. If the free <MEASURE NAME> from MCE's program had not been available, would you have purchased the <MEASURE NAME> at the same time as you received it from MCE?	Yes	1
	FR4c. If the free <MEASURE NAME> from MCE's program had not been available, would you have had the <MEASURE NAME> installed earlier than you did or later?	Earlier	1
		Same Time	1
		Later[A]	(24 - number of months)/24
			If more than 24 months or 2 or more years, 0
			Never = 0
		Would not have purchased energy efficient equipment[B]	0
		Don't know	Average score of non- "Don't know" responses
Efficiency (FR_e)	FR5a. If you were to buy a <MEASURE NAME>, would you have . . . ?	Purchased a more efficient <MEASURE NAME>	1
		Purchased <MEASURE NAME> with the same efficiency level	1
		Purchased a less efficient <MEASURE NAME>	0.75
		Don't know	Average score of non- "Don't know" responses
Multifamily Free Ridership Components			
Timing (FR_t)	FR4b. Would you have purchased the efficient <LIGHTING, KITCHEN APPLIANCES, WATER CONSERVATION MEASURES, EFFICIENT DOMESTIC HOT WATER PUMP> at the same time as you did? (Note to Interviewer: please ask and record response for each type of equipment.)	Yes	1

Free Ridership Component	Survey Question	Response	Free Ridership Score
	FR4b1. Would you have bought the efficient <LIGHTING, KITCHEN APPLIANCES, WATER CONSERVATION MEASURES, EFFICIENT DOMESTIC HOT WATER PUMP> earlier than you did, or later? (Note to Interviewer: please ask and record response for each type of equipment.)	Earlier	1
		Same Time	1
		Later[A]	(48 - number of months)/48
			If more than 48 months, 0
		Would not have purchased energy efficient equipment[B]	0
		Don't know	Average score of non- "Don't know" responses
Efficiency (FR_e)	FR4d. Would you have purchased -the same efficiency of <LIGHTING, KITCHEN APPLIANCES, WATER CONSERVATION MEASURES, EFFICIENT DOMESTIC HOT WATER PUMP>?	Yes	1
		No	0
		Don't know	Average score of non- "Don't know" responses
Quantity (FR_q)	FR4c1. How many/much of the energy efficient <LIGHTING, KITCHEN APPLIANCES, WATER CONSERVATION MEASURES, EFFICIENT DOMESTIC HOT WATER PUMP> would you have purchased without the program	Numeric response	0%, 100%, or mid-point of increment

[A] When the respondent's response to FR4c is either "Earlier" or "Later," we asked the respondent question FR4b2 (SFDI and Multifamily respondents): "How much earlier/later would you have hired a contractor for the <MEASURE NAME>? An estimate of when was fine. This was to determine how many months or years earlier or later they would have the measure installed. We used responses to this question in scoring responses of those who said "Later."

[B] This response option is based on question FR4a, which in the Multifamily Program survey asks: "If the rebate from MCE had not been available, would you still have purchased efficient <MEASURE NAME>?" and in the SFDI Program survey asks: "If the free <MEASURE NAME> from MCE's program had not been available, would you have purchased any <MEASURE NAME>?"

Using the metrics and the individual survey respondents' responses to the questions in Table 25, the evaluation team calculated free ridership scores at the measure level. Equation 3 shows how we derived the free ridership score for the SFDI Program. Equation 4 shows how we would have derived the free ridership score for the Multifamily Program had we been able to achieve a higher rate of completed responses.

Equation 3. SFDI Free Ridership

$$FR = FR_t * FR_e$$

Equation 4. Multifamily Free Ridership

$$FR = FR_t * FR_e * FR_q$$

We then used the free ridership scores to calculate NTG scores (Equation 5). We derived weighted NTG scores using ex ante gross savings.

Equation 5. NTG Score

$$NTG = 1 - FR$$

5.2.3 NTG Results

Based on the data we collected through the SFDI survey, we estimated the NTGR equal to 0.96, as shown in Table 26. To arrive at this estimate, we converted the kWh and therm savings of the measures to BTUs and developed a measure-weighted NTG ratio.[62] When we account for the market effects adder, the NTG ratio is 1.01, which is also presented in Table 26.[63] We present the SFDI program energy and demand savings based on both NTGRs.

Since the evaluated NTGR for the SFDI program is slightly less than 1, the first year net evaluated savings are just slightly below the corrected first year gross savings values. With the market effects adder and a NTGR of 1.01, we find slightly larger negative first year net evaluated electric savings (i.e., kWh savings are even lower) and slightly larger first year net therm savings. The demand savings, when rounded, are equal.

Table 26. PY2021 SFDI Corrected First Year Gross and Evaluated First Year Net Energy and Demand Savings

Energy Savings Unit	eTRM Mapped/Corrected Quarterly Claims Data 2021 Annual	Evaluated NTGR	First Year Net Evaluated Savings	Market Effects Adder Adjusted NTGR	First Year Net Evaluated Savings Using Market Effects Adder Adjusted NTGR
kWh	-9,463	0.96	-9,084	1.01	-9,558
kW	31		30		31
therms	28,142		27,016		28,423

[62] MMBtu is a measurement of energy that means one million British Thermal Units (Btu) and is a way of expressing total energy from both electric and gas savings. 1 MMBtu = 1,000,000 Btu, 1 therm = 100,000 Btu source energy, 1 kWh = 10,239 Btu source energy. Conversion rates obtained from *2001 Energy Efficiency Standards for Residential and Non-Residential Buildings, California Energy Commission*, June 2001.

[63] This includes the 0.05 market effects adder.

5.3 SFDI and Multifamily Programs Findings and Recommendations

5.3.1 Findings

Based on our review of MCE's 2021 claims for deemed SFDI and Multifamily measures, it appears that some of the eTRM data may need to be updated to reflect the latest approved eTRM workpaper/measure packages. It also appears that there is a need for additional measure permutations in the eTRM to cover real-world scenarios, such as the 'HTR' and 'EUC' NTG_IDs. Those issues aside, it appears that MCE is likely claiming some incorrect parameter values such as UES and GSIA. MCE should be able to alleviate this issue, along with some of the others listed, through tighter integration between claims and the eTRM.

The estimated SFDI NTG analysis revealed a program NTGR of 0.96 and a ratio of 1.01 when the market effects adder is included. When we use the market effects added NTGR, we find larger negative energy savings for the program and larger demand and therm savings than the claimed and corrected claimed first year gross savings estimates.

5.3.2 Recommendations

Based on our ex ante review that led us to correct MCE's SFDI and Multifamily program savings claims, we provide a few recommendations for future work that could help address some of the issues encountered. Note that we present further details about the ex ante review in Appendix D.

- We discussed the primary sources of UES and GSIA differences with MCE, and MCE should continue to work with the Deemed Ex Ante and eTRM teams for two reasons:
  - To ensure that measure permutation data stored in the eTRM match the measure packages/workpaper narratives. MCE claim data frequently does not align with the permutation data stored in the eTRM.
  - To ensure that additional measure permutations are added to the eTRM to cover additional options for parameters such as NTG, where 'HTR' and 'EUC' are not offered in the eTRM but are needed by Claims.
- We recommend ED monitor MCE's claims to verify whether the new MeasDetailID field alleviates some of the matching issues. This is useful because:
  - Including the MeasDetailID will likely solve some matching issues and help uncover some of the issues encountered in our analysis; and
  - For those issues that still exist, MCE should work with the eTRM team to ensure that the appropriate values exist in the eTRM.

Beyond the MeasDetailID addition, the CPUC announced plans to integrate the eTRM data more tightly with claims. Since the PAs would not actually be providing any of the parameters addressed above (e.g., UES, NTG, GSIA) in the claim itself, tight integration could alleviate some of the issues we have laid out, although ED should continue to verify the total savings being claimed.

Based on our NTG analysis, we recommend MCE apply the evaluated NTGR to its claim corrected first year gross energy and demand savings for a more accurate representation of its SFDI program savings.

Appendix A. MCE CEM Data Collection Guides

This appendix includes the program aggregator and customer in-depth interview guides used for primary data collection conducted in 2022. The questions below were used to guide discussions with those who participated in the program and were not meant to be followed verbatim.

CEM Program Aggregator Interview Guide

[START]

Thank you for taking the time to speak with us today. I'm calling on behalf of Opinion Dynamics, an independent market research firm. The CPUC hired us to conduct an evaluation of MCE's Commercial Efficiency Marketplace program. From our understanding, your company is an aggregator that participates in this program. We would like to ask you questions about your experience so far.

Role of Aggregator and Customers

What is your role at your company and what are your responsibilities?

What is the main business of your company?

According to the MCE Commercial Efficiency Marketplace Implementation Plan, "aggregators recruit customers (and) install projects, and Recurve will track the impacts using CalTRACK and the OpenEEmeter in the Recurve Platform." Would you agree that this is an accurate description of your company's role in the program? How about Recurve's role?

Customer recruitment: (a) What types of customers do you recruit for participation in the Marketplace program (sector, project type, etc.)? (b) Where do these customers reside? (c) Why are these customers suitable for participating in the Marketplace program?

Program Awareness

How, when, and from whom did you hear about MCE's Commercial Efficiency Marketplace program?

Did you attend any information sessions offered by MCE and/or program manager Recurve? How satisfied were you with the information you learned? Was there anything unclear that could have been better communicated?

Aggregator Enrollment

What did you have to do to sign up as an aggregator for this program (sign agreement, recruit customers, develop savings forecasts, contract with customers, etc.)? How satisfied are you with the process of enrolling in the program?

Have you ever participated in any other MCE EE or Marketplace programs, such as Commercial Upgrade and/or FLEXmarket (a program designed to shift usage from times of high demand to improve grid reliability)? If yes, what features do you prefer about Marketplace programs? What features do you prefer about traditional EE programs? (Ask about qualifying for the incentive, requirements for participation - customer eligibility such as pre-period data availability, flexibility in payment structures, risk/uncertainty in performance payments)

What program support has MCE and/or Recurve provided to your company regarding initial enrollment? Project enrollment? Estimation of program savings and/or incentives? Updates on the status of energy savings performance? How satisfied are you with their support? What have they done well to help support your participation? What could they improve upon?

Customer Enrollment

How do you inform customers about the program? Do you inform them directly about the MCE Marketplace program when enrolling their projects or are they not aware of the larger program in which they are participating?

We want to understand whether you are enrolling your existing customers to the program and/or if you are seeking out new customers. Have you enrolled projects into the program from your existing customer base? Have you enrolled projects from new customers?

What projects have you found to be good candidates for enrollment in the program (compared to standard EE programs)?

When did you enroll your first project in the program?

How many customers and projects did you enroll in 2021? How many have you enrolled so far in 2022? How many additional customers and projects do you anticipate enrolling by the end of 2022?

Savings Forecasting

Who comes up with the forecasted savings for a project - you or Recurve? Or some combination of both? What does this process look like? How satisfied are you with this process?

What tools do you and/or Recurve use to forecast energy savings and how do you/Recurve come up with savings? Do you rely on tools/platform provided by Recurve? Do you use any other tools? How satisfied are you with the process of estimating energy savings?

How do you and/or Recurve come up with forecasted incentives from the forecasted energy savings?

What sort of agreement do you come to with MCE and Recurve about savings delivery and incentive payments?

How confident are you that the performance of your projects or portfolio will be accurately measured? How accurately do you feel the estimate of incentives you received at project outset accurately captures value delivered?

Are energy savings to date matching what was forecast?

Types of Projects Enrolled

Can you describe the types of projects you've enrolled into the program?

Have you focused on certain types of projects to enroll? If so, why? Do you expect larger incentives from these? Do these types of projects have load shifting opportunities?

Financing

Have you or your customers used financing to support project installation? Do you, as the aggregator, receive the financing that you then pay to the customer? Or does the customer seek out the financing independent of you?

If you've relied on financing, what mechanisms have you used? How satisfied have you been with the process? What works well and what could improve?

Program Influence

On a scale of 1 to 10, where 1 is not at all influential and 10 is extremely influential how influential were the following factors in your participation in the program?

- Incentives
- Information shared by MCE about program
- Information shared by Recurve about program
- Age of customers' old equipment
- Your previous experience with similar projects or programs

Does the program, as it operates in 2022, lead you to recruit customers with EE projects that allow for load shifting opportunities more than you would have without the availability of this program?

Has the program led you to accelerate, expand, and/or deepen projects or the types of projects you seek out to enroll in the program?

What is the likelihood you would have recruited the specific customers to enroll their specific projects into this program had you not had support from MCE and/or Recurve?

Program Barriers

Does your company face any barriers to participating in the program? How about the customers you work with?

Do you see any barriers for customers to participate in this program (not having enough pre-period data, for example)?

Assessment of Overall Program

What features of the program appealed to your company the most?

What features of the program do you feel could be most improved? If you could change one element of the program, what would that be?

[END]

CEM Program Customer Interview Guide

Customer Experience

First off, I would like you to please describe your experience with [PROJECT] completed at [LOCATION]. If there were multiple projects, you may speak to your experience completing them as a group.

How did the idea to complete these upgrades originate?

Can you walk me through the steps involved, starting with why you decided to do the upgrade in the [LIGHTING OR HVAC] to when you started working with [AGGREGATOR] to complete the work?

Roughly, how much did the project(s) cost?

Did [AGGREGATOR] discuss the amount of energy (electricity if lighting, electricity and/or gas if HVAC) you would save with the upgrades you completed?

Did [AGGREGATOR] discuss the amount you would save on monthly energy costs in relation to the price of the project?

Did [AGGREGATOR] ever talk to you about if you were getting a discount or rebate on the work based on the energy you would save?

Program Awareness

Are you aware that you participated in a program that offers discounted project costs to customers based on the amount of energy you save after upgrading lighting or HVAC systems? [This type of program is known as the "Marketplace Program"]

IF YES: Were you aware that Marin Clean Energy sponsored this program?

Program Influence [ASK ONLY IF CUSTOMER IS AWARE THAT THEY PARTICIPATED IN A PROGRAM]

On a scale of 0 to 10, where 0 is "not at all influential" and 10 is "extremely influential," how influential were the following factors in your decision to upgrade your facility(s)?

- Pricing of the project
- Information shared by the aggregator about program
- Age of the equipment that was upgraded
- Previous experience or prior success with this equipment
- Previous experience or prior success with similar programs
- Non-energy benefits (such as improved occupant comfort and aesthetic enhancements)
- Payback on the investment or ROI
- Reduced cost of operation (lifecycle cost)

Using a likelihood scale from 0 to 10, where 0 is "not at all likely" and 10 is "extremely likely", if the support from [AGGREGATOR] was not available, what is the likelihood that you would have installed exactly the same program-qualifying efficiency equipment that you did in this project?

If greater than 7, ask: Why do you say that?

[ASK ALL] What action would you have taken if [AGGREGATOR] had not approached you about completing this project? What would you have done differently? For instance, which of the following alternatives would you have been MOST likely to do?

- Installed the same equipment
- Installed standard efficiency equipment or what is required by code
- Installed equipment more efficient than code but less efficient than what you installed through the program
- Delayed the upgrades until you had the upfront capital to complete them
- Done nothing
- Something else [SPECIFY]

[ASK IF Q9=1]

What are the specific reasons you would have installed this exact same equipment?

Customer Experience

What do you believe the program's strengths are? By "the program" I mean the consultant you worked with and the work that was completed.

Do you have any concerns or recommendations for the program to improve?

How would you describe your satisfaction with the upgrades that were installed?

How would you describe your satisfaction with the pricing of the project?

On a scale from 1 to 10 where 1 is "completely dissatisfied" and 10 is "completely satisfied", how would you rate your overall satisfaction with the work completed by [AGGREGATOR]?

On a scale from 1 to 10 where 1 is "not at all likely" and 10 is "extremely likely", how likely would you be to work with [AGGREGATOR] again on a project that would save energy?

Why or why not?

Those are all the questions I have for you today. On behalf of MCE, I want to thank you for taking the time to speak with me today.

Have a great day!

[END]

Appendix B. MCE's CEM M&V Plan and NMEC Rulebook Crosswalk of Findings

The CEM M&V plan enumerates a set of specific components required to adhere to the NMEC Rulebook and is delivered as part of the program's Implementation Plan. Table 1, below, provides a description of what is contained in MCE's M&V plan, the evaluation team's assessment of adherence to the NMEC Rulebook, and considerations or recommendations where appropriate.

Table 27. Assessment of MCE's Population-Level M&V Plan Adherence to NMEC Rulebook

Rulebook Component	NMEC Rulebook Index	NMEC Rulebook Requirements	Assessment of MCE's CEM M&V Plan Adherence to Rulebook
M&V Plan	II. 2. A.1) a.	Analytical methods and software to be used in developing payable and claimable savings estimates	Description: According to MCE's CEM M&V plan, there are multiple savings estimates: pre-installation verification of savings, payable savings, and claimable savings. The plan identifies the analytical method and software for each of these types of estimates as follows: ▪ Pre-installation verification of savings can leverage four estimation options and associated software to 1) provide customers with reliable estimates of savings potential, and 2) confidently forecast impacts and manage performance payment budgets (pp. 3) ▪ Payable savings will be estimated using CalTRACK methods and OpenEEmeter methods and software to provide payments between the PA and aggregator. This approach will also incorporate a comparison group. MCE provides an attachment documenting compliance with the Rulebook. ▪ Claimable savings will leverage payable savings adjusted for free ridership with a deemed NTGR, as well as primary technology EUL, actual load shape, and actual program costs. Assessment: ▪ MCE's CEM M&V plan is sufficiently aligned with the NMEC Rulebook requirements. Our analysis focused specifically on claimable savings, rather than payable savings, given those values are most relevant to third-party evaluation and CPUC oversight. Considerations/Recommendations: ▪ None
M&V Plan	II. 2. A.1) b.	Method(s) and software used to calculate gross and net savings as well as peak impacts, including how they will address:	Description: ▪ MCE's CEM M&V plan outlines the methods and software used to calculate gross and net savings, in addition to addressing normalization, net savings, and non-routine events. Findings are detailed below.

Rulebook Component	NMEC Rulebook Index	NMEC Rulebook Requirements	Assessment of MCE's CEM M&V Plan Adherence to Rulebook
M&V Plan	II. 2. A.1) b. i.	Normalization for weather and other factors; ▪ The NMEC Rulebook specifies that baseline and performance periods must be normalized by long-term weather (CALEE 2018).	Description: ▪ The M&V plan suggests that, for claimable savings, the coefficients of both the baseline and reporting period are fit to the weather conditions of a Typical Weather Year using CZ2010 weather data. Assessment: ▪ MCE's M&V plan indicates that they will use CZ2010 weather for modeling, which uses historical years 1998-2009. The Rulebook suggests using CALEE 2018, which uses historical years 2006-2017. As stated in the NMEC Rulebook, "Final savings claims must be normalized by long term weather based upon the most up-to-date weather files (such as CALEE 2018)." We recognize that CALEE 2018 is noted as parenthetical, however the Rulebook clearly states that final savings claims must use the most recent weather files, which at this time is CALEE 2018 and not CZ2010. Our experience suggests that use of more recent weather data to normalize savings results in more accurate impact estimates. Recommendations/Considerations: ▪ CPUC to determine whether MCE should revise use of weather data to align with NMEC rulebook guidance to use CALEE 2018.
M&V Plan	II. 2. A.1) b. ii.	Determination of net savings; ▪ The NMEC Rulebook specifies that the M&V plan must explain if using default net-to-gross values or some other method (e.g., a comparison group or other adjustments).	Description: Per the M&V plan, MCE's CEM program will adjust gross savings using a comparison group and adjust for free ridership using a fixed net-to-gross value (pp. 6-7). ▪ "A comparison group for each aggregator portfolio will be maintained for a gross savings adjustment. The same savings calculation as described in the "gross savings" section, including method and software, will be applied to understand participant and comparison group changes in energy consumption. The calculated incremental impact of the program over the non-participant population will adjust both payable and claimable savings for the portfolio. The adjusted gross will be the difference of differences on a percentage basis applied to the counterfactual baseline to determine the value of the savings." ▪ "For payable and claimable net savings, Recurve will apply the 0.95 approved net-to-gross ratio adopted for Commercial NMEC programs

Rulebook Component	NMEC Rulebook Index	NMEC Rulebook Requirements	Assessment of MCE's CEM M&V Plan Adherence to Rulebook
			in the October 12, 2019 DEER Resolution[64] to account for free ridership." Assessment: ▪ According to the NMEC Rulebook, net savings can be determined using "default net-to-gross values or some other method (e.g., comparison group and other adjustments." Further, it notes that "a comparison group analysis can help determine net savings by accounting for externally-driven changes or trends that affect energy usage." However, the Rulebook does not specify if both should be used at the same time. As a result, the Rulebook is not explicit about whether NTG and comparison groups should be used in tandem. Considerations/Recommendations ▪ None
M&V Plan	II. 2. A.1) b. iii.	Outlier site and non-routine event identification and data treatment including filtering and other amelioration. ▪ The NMEC Rulebook requires a description of the program's approach to non-routine events in their baseline period as well as participation in other EE and DSM programs (e.g., EVs, solar PV, storage, tenant turnover, etc.).	Description: ▪ MCE's CEM M&V plan states that "in the process of customer acquisition, aggregators will verify with customers that they have not, nor do they plan to install, major new load additions or subtractions, solar PV, or EV charging in the reporting year (post-program implementation). In addition, aggregators will work with Recurve and MCE to ensure that customers are not participating in another energy efficiency program, have not installed an EV charging system, or solar PV or battery storage within the baseline year (pp. 17)." Assessment: ▪ Based on our evaluability assessment, it was discovered that information is not currently gathered about any potential non-routine events. However, Recurve does conduct analysis to ensure that there is data sufficiency for baseline model fit, detect any events on a quarterly basis, and apply adjustments in coordination with discussions with the aggregator. Considerations/Recommendations: It may be useful to follow-up after installation (during or after the post-installation analysis period) to ensure that no non-routine events have occurred. However, the M&V plan also lays out an analytic approach to screen projects for possible non-routine events. From an evaluation

[64] Resolution E-4952. 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. See p. A-45 for table of NMEC NTG ratios. http://docs.cpuc.ca.gov/publisheddocs/published/g000/m232/k459/232459122.pdf

Rulebook Component	NMEC Rulebook Index	NMEC Rulebook Requirements	Assessment of MCE's CEM M&V Plan Adherence to Rulebook
			perspective, customer contact information is provided, so customers could be surveyed about any non-routine events that may have occurred during the analysis period.
M&V Plan	II. 2. A.1) c.	Hourly load shape impact calculations and peak impacts	Description: ▪ The M&V plan provides documentation for calculation of hourly load shapes and peak impact calculations. Assessment: ▪ The M&V plan description is sufficient. Considerations/Recommendations: ▪ None
M&V Plan	II. 2. A.1) d. and A.1) e.	Data collection plan and approach to ensuring adequate monitoring of energy savings. ▪ The NMEC Rulebook requires "adequate monitoring and documentation of energy savings, including meter mapping for each project over the reporting period."	Description: ▪ The M&V plan provides a variety of information related to data collection and monitoring. MCE will incorporate project, site and meter level data captured by the program aggregator or provided by MCE to support monitoring energy savings. These data include participant, location, meter ID, date of installation, technology installed, and project costs. In addition, Recurve will draw a sample of non-participant customer data from MCE to support comparison group development. Further, the M&V plan indicates that "Recurve will provide a fully auditable and verifiable record to track each meter that is modeled and its fate over the course of the program. MCE will oversee the QA/QC process to verify measure installation through a separate agreement (pp. 12)." Assessment: The M&V plan provides sufficient documentation per the NMEC Rulebook. However, provision of all data captured by aggregators, Recurve, and the program administrator is essential. Opinion

Rulebook Component	NMEC Rulebook Index	NMEC Rulebook Requirements	Assessment of MCE's CEM M&V Plan Adherence to Rulebook
			Dynamics' recent evaluability assessment indicates that MCE is collecting all the necessary data to conduct an evaluation, including: ▪ Detailed information on the equipment installed and removed at the measure level, which would allow for estimation of measure-specific savings; ▪ Account and meter IDs used to merge customer information system (CIS), monthly billing, and advanced metering infrastructure (AMI) data; ▪ Installation and completion dates to determine the pre- and post-installation periods for analysis; ▪ Location (address) of the facility to determine the correct weather data to use for normalization and aid in possible control group matching; ▪ Building type information (along with other firmographic data available on the CIS that can be obtained by merging account ID) to aid in control group matching; and, ▪ Customer contact information. Considerations/Recommendations: ▪ None
M&V Plan	II. 2. A.1) f.	A description of plans for: ▪ Permissible project types ▪ Program design criteria ▪ Payments and incentives ▪ Qualifying measures ▪ Cost effectiveness	See section "Qualifying Projects/Measures" below for more detail. Description: ▪ The M&V plan incorporates sections that reflect permissible project types, program design criteria, payments and incentives, qualifying measures, and cost effectiveness. ▪ Cost effectiveness is sufficient to meet Rulebook guidance. Assessment: ▪ The M&V plan adheres to NMEC Rulebook guidance.
M&V Plan	II. 2. A.1) g.	Description of program participant eligibility criteria.	See response provided in row II. 2. A.1) b. ii. Above.
M&V Plan	II. 2. A.1) h.	EUL calculation and compliance with current Technical Guidelines. ▪ The NMEC Rulebook requires a description of how the project and program-level EULs will be calculated demonstrating compliance with current Technical Guidelines for determining weighted average EUL, unless staff approves an alternative method for EUL calculation.	Description: ▪ The M&V plan indicates that MCE will use the following fields for claimable savings: "include the estimated useful life (EUL), load shape, and costs. These parameters of claimed savings will be handled in accordance with CPUC reporting requirements. Aggregator portfolios of reasonably consistent measures will utilize an EUL matching the primary measure or technology installed. Savings will be claimed using the actual load shape (pp. 5)." Further, the plan provides specificity as to the weighted average

Rulebook Component	NMEC Rulebook Index	NMEC Rulebook Requirements	Assessment of MCE's CEM M&V Plan Adherence to Rulebook
			EUL applied to three measure types: DEER:Indoor_Non_CFL_Ltg, DEER:HVAC_Chillers, and finally, DEER:HVAC_Split-Package_HP. Additionally, the M&V plan states that "In preparing savings claims, Recurve and MCE will develop combined measure claims in accordance with the CPUC's guidance on Weighted Average Expected Useful Life/Net to Gross Method.[65] Since the outputs of the calculator are dependent on the savings achieved, the projected EUL for this program is not yet known. The forecasted savings in the Annual Budget Advice Letter (ABAL) are utilizing the EUL's of the primary measures, assuming single measure installations by site." Assessment: ▪ MCE's M&V plan provides sufficient documentation of the planned EUL for three measure types. Recommendations/Considerations: ▪ None
M&V Plan	II. 2. A.1) i.	Description of incentive structures. ▪ According to the Rulebook, "a full description of the method(s) and calculation software that will be used to determine payable and claimable savings, and the payment terms for any planned payments (to customers, third party implementers, contractors) based on savings measured using Population-level NMEC methods. Describe if/how payable savings may differ from claimable savings, and if so, why is this appropriate and how will the program address risk.	Description: According to MCE's M&V plan: ▪ Payable savings differ from claimable savings. Payable savings will incorporate a comparison group. Claimable savings will leverage payable savings adjusted for free ridership with a deemed NTGR, as well as primary technology EUL, actual load shape and actual program costs. ▪ Aggregators will receive an "efficiency" and a "flexibility" payment based on the performance of their portfolio of projects and calculated based on actual savings at the meter. The flexibility payment is designed to incentivize an improved load shape value over deemed assumptions. Both payments are net of upfront customer contributions to the cost of the project and administrative costs, and will occur in the first year following project completion based on metered savings achieved and the deemed load shape. The aggregator will not receive payment if the net benefits from their

[65] Rolling Portfolio Program Guidance: Weighted Average Expected Useful Life/Net to Gross Method. Excel Spreadsheet titled "Combining_Measures_Claims-DRAFT." The spreadsheet calculator has not been updated to reflect new DEER values so can only be used with respect to the proposed method. https://www.cpuc.ca.gov/General.aspx?id=6442456320 (note that the hyperlink referenced here from the M&V plan no longer returns the Rolling Portfolio Program Guidance referenced in this footnote). The evaluation team conducted a search for the specific spreadsheet online but could not locate it.

Rulebook Component	NMEC Rulebook Index	NMEC Rulebook Requirements	Assessment of MCE's CEM M&V Plan Adherence to Rulebook
			portfolio do not exceed the corresponding costs, including participant and implementation costs (pp. 15-16). ▪ In this model, the aggregator takes on the upfront risk, while MCE and ratepayers take on minimal risk compared to deemed program models because MCE will only pay for savings achieved at the meter that meet minimum cost effectiveness criteria (pp. 19-20). Assessment: ▪ MCE's M&V plan provides how payable and claimable savings will be developed, demonstrates that incentives will be based on measured savings, and documents how the program addresses risk. Recommendations/Considerations: ▪ None
M&V Plan	II. 2. A.1) j.	Compliance with D.17-11-006 targeting to-code savings. ▪ According to the Rulebook, "Implementation plans, for programs that target (or will claim) to-code savings, describe what program design elements, data collection activities, and/or analyses will be conducted … as part of the planned implementation of the proposed program."	Description: MCE's M&V plan states that the program is targeting to-code savings as described in the implementation plan, and compliance is described in Section 6 of the Implementation Plan. Further, the M&V plan will quantify savings compared to an existing conditions baseline as authorized in AB802, SB350 and the methods section of the plan (pp. 20). Assessment: ▪ The M&V plan provides sufficient documentation for compliance with D.17-11-006. Recommendations/Considerations: ▪ None
M&V Plan	II. 2. A.1) k.	A copy of any Bid M&V Plan submitted by third-party implementers in their bid. ▪ According to the NMEC Rulebook, the Bid M&V Plan should incorporate the following "a) description of the program target population and participant eligibility criteria; b) Documentation of the expected costs, energy savings and effective useful life (EUL) of planned measures and intervention strategies; c) Identification of the method(s) and calculation software that will be used to calculate savings, including required information as outlined elsewhere in this rulebook."	Description: ▪ Per MCE's M&V plan, "The Commercial Marketplace will not conduct a bidding process for this program. It will utilize an aggregator qualification approach that reduces barriers to entry. Bid M&V plans will not exist." Assessment: ▪ The M&V plan appropriately does not include a bid M&V plan but does incorporate the requirements related to target population, documentation, and calculation software enumerated above. Recommendations/Considerations: ▪ None

Rulebook Component	NMEC Rulebook Index	NMEC Rulebook Requirements	Assessment of MCE's CEM M&V Plan Adherence to Rulebook
Qualifying Projects/ Measures	II. 2. B.1)	*Permissible Project Types – Site-Level* Population-level NMEC programs must also adhere to site-level qualifying criteria including: ▪ NMEC projects must occur in existing buildings and consist of measures suitable for an existing conditions baseline. ▪ NMEC programs are not permissible for industrial operations and maintenance, or behavior, retro-commissioning and operations projects unless participant agrees to a minimum of a three-year treatment plan and with provision of continuous feedback and training to sustain savings drivers of energy consumption. ▪ NMEC does not allow new construction projects.	Description: Based on the evaluability review and an understanding of the current participants and the M&V plan, the program targets commercial customers in existing buildings. ▪ No industrial customers are included based on preliminary review. Assessment: ▪ Qualifying projects are consistent with NMEC Rulebook guidance. Considerations/Recommendations: ▪ None
Qualifying Projects/ Measures	II. 2. B.2) a. and b.	*Permissible Project Types – Population-Level* Population-level NMEC program sites must have building-type similarity such that: ▪ The sites can reasonably be expected to have similar types of equipment holdings as well as drivers and levels of energy consumption; and, ▪ There should be a reasonable expectation that the factors that impact both 1) consumption over a 12-month period as well as 2) energy savings from program interventions, will be similar across all sites in the population.	Description: ▪ MCE's M&V plan leverages a population-level NMEC approach, which is consistent with the program design, implementation, and M&V strategy because it meets the program design criteria related to expected savings and permissible project types related to building-type similarity, consumption trends and existing equipment as well as likely impact of interventions. Assessment: ▪ Qualifying projects are consistent with NMEC Rulebook guidance, with the exception of fuel substitution measures. Notably, depending on how many sites install fuel substitution measures, the criteria that "energy savings from program interventions will be similar across all sites in the population" may not be met with the inclusion of fuel substitution measures. Considerations/Recommendations: ▪ None
Qualifying Projects/ Measures	II. 2.C.1)	*Program Design Criteria* Population-level NMEC program designs must meet or exceed the following threshold. These criteria are based on the best available information we have today but	Description: ▪ According to MCE'S M&V plan, "If the Commercial Marketplace is able to achieve 500 installations of the planned technologies, and achieve the forecasted average savings, FSU will fall well within the bounds of the CPUC requirements. Recurve expects to achieve the

Rulebook Component	NMEC Rulebook Index	NMEC Rulebook Requirements	Assessment of MCE's CEM M&V Plan Adherence to Rulebook
		may be adjusted in the future as more is understood regarding their viability. ▪ At least 90% confidence / 25% range Fractional Savings Uncertainty (FSU) as calculated using the American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE) methods at the daily level, or using other methods that achieve at least the same levels of certainty.[66]	CPUC's stated desired FSU of +/- 25% at the 90% confidence level by recruiting a sufficient number of projects, supporting aggregators in recruiting customers with a reasonable CVRMSE (generally less than 0.75), monitoring savings for a sufficient number of days (FSU will be calculated with the CalTRACK daily model), and delivering a reasonable savings depth measured from existing conditions baseline." Assessment: ▪ The MCE M&V plan provides appropriate documentation for program design criteria. Consideration/Recommendation: ▪ Recommend program administrator monitor number of projects and customer CVRMSE throughout program implementation period to determine adherence to confidence and FSU thresholds.
Qualifying Projects/ Measures	II. 2.D.1), 2) and 3)	*Payments and Incentives* Payments to Implementer(s) made by PAs must be based on payable savings determinations measured using population-level NMEC approaches, as described below. There is no requirement for customer incentives to be based on payable savings determinations. ▪ 1) Ideally, 100% of total PA payments for each population-level program should be made based on payable savings determinations using NMEC methods. At a minimum, 50% of the total PA program payments for each population-level NMEC Program (not including PA administrative or PA measurement and verification costs) must be based on payable savings determinations made using population-level NMEC methods.	Description: According to MCE's M&V plan: ▪ All payments to the aggregator will be based on payable savings using a population-level NMEC approach. No incentives are distributed to customers. ▪ Because this is not a third-party program, II.2.D.2) is not applicable. Because the program design pays aggregators after payable savings are measured, II.2.D.3) is not applicable. Assessment: ▪ MCE's M&V plan adheres to payment and incentive guidance; however, it is unclear whether payable savings are conducted at a population-level versus an aggregator-level. This is immaterial from a claimable savings review perspective but may be relevant from an adherence to Rulebook guidance perspective. Recommendations/Considerations: ▪ None

[66] If this threshold is not met or exceeded in the program design, then the PA must submit the program-level M&V plan in a pre-program advice letter filing with a Tier 2 status, or Tier 1 for existing programs. Advice letters submitted for third-party solicitation contract approval, or other advice letters filed in accordance with these rules, may be used for this purpose. Population-level NMEC program implementation may begin only after the advice letter has been approved. The program-level M&V plan must contain an explanation of why the above threshold is not possible or unnecessary, and what is being done in its place to ensure that savings are distinguishable from normal variations in consumption, mitigate risk to ratepayers, and provide value for resource planning.

Rulebook Component	NMEC Rulebook Index	NMEC Rulebook Requirements	Assessment of MCE's CEM M&V Plan Adherence to Rulebook
		▪ 2) If the above threshold is not met, then the PA must submit the program-level M&V plan in a preprogram advice letter filing with a Tier 2 status, or Tier 1 for existing programs. Advice letters submitted for third-party solicitation contract approval, or other advice letters filed in accordance with these rules, may be used for this purpose. Population-level NMEC program implementation may begin only after the advice letter has been approved. ▪ 3) With regard to payment schedules and true-ups: PA payments may occur before payable savings determinations are complete (i.e., after the 12-months post-intervention measurement period), or even before the intervention itself, as long as the total payment amount for the program is trued up after 12-month post-intervention measurement period is complete and final payable savings determinations are made.	
Qualifying Projects/ Measures	II. 2.E.1), 2) and 3)	*Qualifying Measures* Measures allowed in population-level NMEC programs include: ▪ Measures currently allowable through the deemed and custom energy efficiency programs; ▪ Other measures where the program documentation and program-level M&V plan demonstrate that the savings and EUL forecasts are reasonable for these measures; and, ▪ Behavioral, retro-commissioning and operational measures are permissible per the site-level NMEC requirements outlined in Section II.1.BE.2) of this rulebook.	Description: ▪ MCE's M&V plan indicates that program measures include lighting, HVAC, and heat pump fuel substitution measures. Assessment: ▪ The MCE M&V plan is consistent with Rulebook guidance. However, the Rulebook does not provide guidance as to whether fuel substitution measures are eligible for population-level NMEC modeling. Consideration/Recommendation: ▪ MCE and CPUC should coordinate with an evaluation team to identify whether fuel substitution measures are applicable and appropriate for existing modeling approaches.

Rulebook Component	NMEC Rulebook Index	NMEC Rulebook Requirements	Assessment of MCE's CEM M&V Plan Adherence to Rulebook
Savings Claims	III. 2. B. 1), 2), 3) and 4)	▪ Must be made at the program-level. ▪ Must be made using the savings determination stipulated in the M&V plan. ▪ Must be normalized by long term weather (CALEE 2018) with weather applied to the baseline and performance period.	Description: ▪ MCE's M&V plan stipulates that savings claims will be made at the program level. ▪ As part of the ex post evaluation, the evaluator will review to ensure that savings were determined as stipulated in the plan. ▪ MCE's M&V plan suggests that for claimable savings, the coefficients of both the baseline and reporting period are fit to the weather conditions of a Typical Weather Year using CZ2010 weather data. Assessment: ▪ MCE's M&V plan indicates that they will use CZ2010 weather data for modeling, which uses historical years 1998-2009. The Rulebook suggests using CALEE 2018, which uses historical years 2006-2017. Recommendations/Considerations: ▪ Revise weather data to align with NMEC rulebook guidance calling for CALEE 2018 to be used.
Measurement Period	III. 3. A. 3)	At least 12 months of pre- and post-intervention energy consumption. ▪ NMEC Rulebook indicates that implementers should monitor the data collected one to two months into the reporting period to ensure appropriate monitoring is occurring, particularly for deviations from expected savings, to identify and adjust for non-routine events (pp. 15).	Description: Per MCE's M&V plan: ▪ "CalTRACK data handling…will be followed which screens for pre-intervention baseline data criteria: …Consumption and temperature data should be sufficient to allow for a 365-day baseline period." Additionally, MCE's M&V plan specifies the baseline calculation as 365 days of pre-intervention data prior to program enrollment (pp. 5-6). ▪ The plan also indicates that all adjustments for non-routine events will be captured in an electronic ledger that tracks all stages of an NMEC project in a program (pp. 16). Assessment: ▪ MCE's M&V plan specifies the appropriate amount of time for pre- and post-period installation. Further, Recurve will check for any potential non-routine events on a quarterly basis. Considerations/Recommendations: ▪ None
M&V Report	III. 2. B. 4) and III. 1. B.	▪ Documents activities carried out per the M&V plan. ▪ Documents data collection models and all findings. ▪ Presents the first year and lifecycle savings claims, final avoided energy use, and final normalized energy savings.	Description: ▪ Per MCE's M&V plan, "Certification of compliance and documentation of data handling will validate uniform application to all sites in the program." Assessment: ▪ Certification will provide additional documentation to substantiate savings claims.

Rulebook Component	NMEC Rulebook Index	NMEC Rulebook Requirements	Assessment of MCE's CEM M&V Plan Adherence to Rulebook
		▪ Substantiates savings claims consistent with specifications in the M&V plan.	Considerations/Recommendations: ▪ The impact evaluation team should verify savings claims as part of the ex post evaluation. Notably, MCE's M&V plan does not explicitly document how first year and lifecycle savings will be captured, although it does provide information regarding application of EULs.
Data Provision	III. 3. A. 5)	Data provision requirements include: ▪ Savings calculations (including analytical methods, tools, algorithms, and software used in savings calculations); ▪ Underlying data and other data inputs; and, ▪ Calculations.	Description: According to MCE's M&V plan, ▪ "The methods used to calculate savings are referenced in the program-level M&V plan and the details for savings calculation, including data handling and weather station selection, are documented in the CalTRACK 2.0 Technical Specification." ▪ "Recurve will provide a fully auditable and verifiable record to track each meter that is modeled and its fate over the course of the program." ▪ "All data will be made available. In addition, data handling and calculations will be documented and provided to PA, CPUC, and evaluators to quickly isolate any differences in results using the same data" (pp. 22). ▪ "Interim savings determinations will be assessed on an ongoing basis but reported annually and based on the Commission guidelines." Assessment: ▪ There is sufficient documentation to indicate that MCE will provide the required data to support third-party impact assessment. Considerations/Recommendations: ▪ Ensure that all data, calculations, and results enumerated in the M&V plan are provided in a timely and complete fashion to support the impact evaluation.

Appendix C. Commercial Upgrade Lighting Telephone Survey

INTRODUCTION AND FINDING CORRECT RESPONDENT

IF <%EMPTY> = 1 then DISPLAY:

Note that this participating facility may be vacant, and you may be put in touch with a property manager.

OUTCOME1

This is %n calling on behalf of the CPUC. THIS IS NOT A SALES CALL NOR A SERVICE CALL. May I please speak with …<%CONTACT> …<%OLDCONTACT> … <%BUSINESS> … the person at your organization that is most knowledgeable about your participation in <%UTILITY>'s <%PROGRAM> program. !___[IF NEEDED]…This is a fact-finding survey only, authorized by the California Public Utilities Commission.

XX	BEGIN THE INTERVIEW	Continue
101	NO ANSWER	Record response and attempt again at a later time
102	BUSY	Record response and attempt again at a later time
111	CHANGED NUMBER	Record new number and attempt again
107	ANSWERING MACHINE / VOICE MAIL	Record response and attempt again at a later time
104	CALLBACK-Specific	Record response and schedule time to callback
105	CALLBACK-General	Record response and get best time to callback
5	NON-WORKING NUMBER	Record response and resolve record
6	NON-BUSINESS NUMBER	Record response and T&T

14	OTHER PHONE PROBLEM / FAX / MODEM	Record response and resolve record
12	REFUSAL	Record response and T&T
19	ASKED TO BE PLACED ON DNC LIST	Record response and T&T
15	LANGUAGE/HEARING PROBLEM	Record response and T&T
10	CLAIMS TO HAVE BEEN PREVIOUSLY INTERVIEWED	Record response and T&T
94	MAXIMUM CALL ATTEMPTS	Record response and resolve record
900	DUPLICATE PHONE NUMBER	DO NOT LOAD - RESOLVE RECORD
901	ON PMR DNC LIST	DO NOT LOAD - RESOLVE RECORD
999	INVALID PHONE NUMBER	DO NOT LOAD - RESOLVE RECORD
Thank & Terminate PBLOCK NO_ONE	Thank you for your time. For this study, we need to speak to someone about your organization's installation of energy efficient equipment that your organization installed through <%UTILITY>'s <%PROGRAM> program.	END

Q1B

[IF YOU ARE TRANSFERRED TO ANOTHER PERSON OTHER THAN THE BEST CONTACT]
Who would be the person most familiar about your organization's participation in <%UTILITY>'S <%PROGRAM> program? [ENTER NEW CONTACT NAME AND MOVE ON]

[IF NEEDED] This is not a sales call.

[IF NEEDED] This is a fact-finding survey only, and responses will not be connected with your firm in any way. The California Public Utilities Commission wants to better understand how businesses think about and manage their energy consumption.

77	There is no one here who can help you	T&T

02	CALL BACK TO REACH PROPER PARTY	Record response and get best time to callback
1	Continue Q1B until you find appropriate contact person, record as &NEW CONTACT NAME	Intro3:s

Intro3:S

[IF BEST CONTACT IS AVAILABLE]
Hello, my name is _____%n_____ and I am calling on behalf of the California Public Utilities Commission. THIS IS NOT A SALES CALL. We are interested in speaking with the person most knowledgeable about your organization's participation in … <%UTILITY>'s <%PROGRAM> program during 2021..I was told that would be you.
…Your organization participated in <%UTILITY>'s <%PROGRAM> by installing lighting equipment in 2021.

Through this program, your organization installed….
<%CUSTOM_MEASURE> on <CUST_INSTALL_DATE>…<CUST_PAID_DATE>…
<%UNITS_1> … <%MEASURE_1> on <MEASURE_1_DATE>
<%UNITS_2> … <%MEASURE_2> on <MEASURE_2_DATE>
<%UNITS_3> … <%MEASURE_3> on <MEASURE_3_DATE>
Are you the best person to speak to about your organization's participation in this program?

[If you need to provide validation for this survey, provide the following contact name and number: Peng Gong, California Public Utilities Commission / peng.gong@cpuc.ca.gov and the following website: www.cpuc.ca.gov/eevalidation]

1	Yes	DISPLAY
2	No, there is someone else	PBLOCK Hi
3	No and I don't know who to refer you to	Thank&Terminate
5	Property management company handles this	PMNAME
99	Don't know/refused	Thank&Terminate

PMNAME

May I have the name and contact information of your property management company?

1	Yes – RECORD	Record Response and T&T
88	Refused	Thank&Terminate
99	Don't Know	Thank&Terminate

PBLOCK Hi Who would be the person at this location who is most knowledgeable about this facility's energy using equipment? [Enter New Contact Name and move on.]

77	Record Name, as &CONTACT	May_I
88	Refused	Thank&Terminate
99	Don't know	Thank&Terminate

May_I May I speak with him/her?

77	Yes	Intro3:s
88	No (not available right now@, set cb)	Get best time to callback

DISPLAY

Before we start, I would like to inform you that for quality control purposes, this call may be monitored by my supervisor.

Today we're conducting a very important study on the energy needs and perceptions of organizations like yours. We are interested in how organizations like yours think about and manage their energy consumption.

Your input will allow the California Public Utilities Commission to build and maintain better energy savings programs for customers like you. And we would like to remind you, your responses will not be connected with your organization in any way. For more information about opting out and how we use and secure your information, see our Privacy Policy at https://pac01.us?PP.

SCREENER

VERIFY For verification purposes only, may I please have your name?

77	Get name	Scrn_Addr
88	Refused	Scrn_Addr
99	Don't know	Scrn_Addr

DISPLAY For the sake of expediency, I will refer to ....<%UTILITY>'s <%PROGRAM> ...program as the PROGRAM.

Scrn_Addr First, I'd like to ask you a few questions about your organization and facility. Our records show your organization is located at %ADDRESS in %CITY. Is that correct?

[CONTINUE IF ADDRESS REPORTED BY RESPONDENT IS SIMILAR ENOUGH]

1	Yes	Bus_Name
2	No	CORRECT
88	Refused	COMMENT
99	Don't Know	COMMENT

COMMENT We were attempting to reach <%UTILITY>'s customer at <%ADDRESS> and since you cannot confirm this address, those are all the questions that we have for you today, on behalf of the California Public Utilities Commission, thank you for your time.

CORRECT May I have your correct address?

%CORRECT	Corrected Address	COMPARE

COMPARE Are these addresses similar or totally different?
Computer Address - %ADDRESS
Corrected Address - &CORRECT

1	Similar	Bus_Name
2	Totally Different	COMMENT2

COMMENT2	We were attempting to reach the <%UTILITY> customer at <%ADDRESS> in <%CITY> and since that does not match your address, then we must have mis-dialed the telephone number. Those are all the questions that we have for you today, on behalf of the California Public Utilities Commission. Thank you for your time and cooperation.	Thank and Terminate

BUS_NAME Our records show your organization's name as: <%BUSINESS> <%CONTACT> <%OLDCONTACT>. Is that correct?

1	Yes	INCENT
2	No	Bus_Correct
88	Refused	COMMENT
99	Don't Know	COMMENT

BUS_CORRECT What is the correct name for your organization?

&BUS_CORRECT	Corrected Business	INCENT

INCENT What percentage of the cost of your rebated equipment was covered by the program?

77	RECORD RESPONSE	A1gg
101	REFUSED	FM050
102	DON'T KNOW	A1gg

IF INCENT <> 100 then ask; Else skip to FM050

A1gg What incentive amount did your organization receive from the program towards your energy efficient equipment installation?

77	RECORD VERBATIM	FM050
88	Refused	FM050
99999	Don't know	FM050

FM050 What is the main business ACTIVITY at this facility? [DO NOT READ] (SINGLE RESPONSE)

1	Offices (non-medical)	V1
2	Restaurant/Food Service	V1
3	Food Store (grocery/liquor/convenience)	V1
4	Agricultural (farms, greenhouses)	V1
5	Retail Stores	V1
6	Warehouse	V1
7	Health Care	V1
8	Education	V1
9	Lodging (hotel/rooms)	V1
10	Public Assembly (church, fitness, theatre, library, museum, convention)	V1
11	Services (hair, nail, massage, spa, gas, repair)	V1
12	Industrial (food processing plant, manufacturing)	V1
13	Laundry (Coin Operated, Commercial Laundry Facility, Dry Cleaner)	V1
14	Condo Assoc./Apartment Manager (Garden Style, Mobile Home Park, High-rise, Townhouse)	V1

15	Public Service (fire/police/postal/military)	V1
77	OPEN\Record Other Service Shop	V1
88	Refused	V1
99	Don't know	V1

ROLE OF CONTRACTORS

V1 Did you use a contractor/vendor to install any of the energy efficient measures that were purchased through the program?

1	Yes	V2
2	No	AP9
88	Refused	AP9
99	Don't Know	AP9

If V1 = 1 then ask; else skip to AP9

V2 How did you come into contact with the contractor/vendor?

1	They contacted you	V2b
2	You contacted them	V3
3	You had worked with them before	V2a
77	OTHER - Record	V3
88	Refused	V3
99	Don't Know	V3

Ask if V2 = 3; else skip to V2b

V2a In relation to this project, did the vendor/contractor approach you about your energy efficient equipment retrofit/installation?

1	Yes	V2ab
2	No	V3
88	Refused	V3
99	Don't Know	V3

Ask if V2a=1 **else skip to V2b**

V2ab Did the VENDOR recommend purchasing high efficiency equipment instead of standard efficiency equipment?

1	Yes	V2b
2	No	V2b
88	Refused	V2b
99	Don't Know	V2b

Ask if V2 = 1 or V2a = 1; else skip to V3

V2b On a scale of 0 - 10, with 0 being NOT AT ALL LIKELY and 10 is VERY LIKELY, how likely is it that your organization would have installed this new equipment had the contractor/vendor not contacted you?

1	0-10 response	V3
88	Refused	V3
99	Don't Know	V3

V3 Did the contractor/vendor tell you about or recommend the program?

1	Yes	V3a
2	No	AP9
88	Refused	AP9
99	Don't Know	AP9

V3a Did you install what your VENDOR recommended?

1	Yes	V4
2	No	V4
88	Refused	V4
99	Don't Know	V4

Ask if V3 = 1; else skip to AP9

V4 Prior to coming into contact with the contractor/vendor, did your organization have plans to replace/install this equipment?

1	Yes	V4a
2	No	V4a
88	Refused	V4a
99	Don't Know	V4a

V4a Using the same scale of 0 - 10 as before, how likely is it that your organization would have installed the new energy efficient equipment had the contractor/vendor not recommended it?

1	0-10 response	V4b
88	Refused	V4b
99	Don't Know	V4b

V4b Using the same scale, how likely is it that your organization would have installed the energy efficient equipment with the same level of efficiency if the contractor/vendor had not recommended to do so?

1	0-10 response	V40
88	Refused	V40
99	Don't Know	V40

V40 On a scale of 0 - 10, with 0 being not at all important and 10 being very important, how important was the input from the contractor you worked with in deciding which specific equipment to install?

1	0-10 response	AP9
88	Refused	AP9
99	Don't Know	AP9

PROGRAM AWARENESS

Next, I'd like to ask you about various energy efficiency programs and what influenced your program participation.

AP9 How did you FIRST learn about <%UTILITY>'s program? [DO NOT READ ANSWERS] (SINGLE RESPONSE)

1	Bill insert	AP9a
2	Program literature	AP9a
3	Account representative	AP9a
4	Program approved vendor	AP9a
5	Program representative	AP9a

6	Utility or program website	AP9a
7	Trade publication	AP9a
8	Conference	AP9a
9	Newspaper article	AP9a
10	Word of mouth	AP9a
11	Previous experience with it	AP9a
12	Company used it at other locations	AP9a
13	Contractor	AP9a
14	Result of an audit	AP9a
15	Part of a larger expansion or remodeling effort	AP9a
77	Other (RECORD VERBATIM)	AP9a
88	Refused	A1b
99	Don't know	A1b

If AP9 in (1-77) then ask; else skip to [MEASURE]

AP9a How ELSE did you learn about <%UTILITY>'s program? [DO NOT READ LIST, ACCEPT MULTIPLES]

1	Bill insert	N33
2	Program literature	N33
3	Account representative	N33
4	Program approved vendor	N33
5	Program representative	N33
6	Utility or program website	N33
7	Trade publication	N33
8	Conference	N33
9	Newspaper article	N33
10	Word of mouth	N33
11	Previous experience with it	N33

12	Company used it at other locations	N33
13	Contractor	N33
14	Result of an audit	N33
15	Part of a larger expansion or remodeling effort	N33
66	No other sources	N33
77	Other (RECORD VERBATIM)	N33
88	Refused	N33
99	Don't know	N33

If AP9 = 3 or AP9A = 3 then ask; else skip to [MEASURE]

You mentioned that you have a Utility or Program Administrator Account Rep.
Can you give me his or her name?
!!___Do you have his/her email address?
!___Do you have a phone number for him/her?
N33 !___Do you have a cell phone number for him/her?

77	RECORD NAME, Phone, Email, etc.	A3A
88	Refused	A3A
99	Don't know	A3A

PROGRAM LIGHTING EQUIPMENT

Ask if LIGHTING = 1; else skip to NEXT BATTERY

Comment	One way that organizations like yours can reduce their energy use is to install more energy efficient lighting equipment. I would like to ask you about the lighting changes you made as part of your participation in <%UTILITY>'s program.	A3[A]

ASK IF LT_QTY_x > 0; ELSE SKIP TO A3a[A-C]

A3[A-C] According to our records, your organization installed <%LT_QTY_x> <%LT_MEAS_x> through <%UTILITY>'s program, is this correct?

1	Yes - Quantity is Correct	DEEMED_INSTALL_DATE_NU
2	Yes - Installed Different Quantity	A3_QTY
3	No, did not install	DISPLAY
88	Refused	DISPLAY
99	Don't know	DISPLAY

ASK A3a[A-C] if LT_QTY_x = 0

A3a[A-C] According to our records, your organization installed <%LT_MEAS_x> through <%UTILITY>'s program, is this correct?

1	Yes	A3_QTY
2	No, did not install	DISPLAY
88	Refused	DISPLAY
99	Don't know	DISPLAY

DISPLAY **IF A3[A-C](3 - 99), READ: "We must conduct this study with someone that knows about the installation of this measure." and ABANDON USER. Else continue with A3[A-C]_QTY**

Ask if A3[A-C] = 2 or A3a[A-C] = 1

A3[A-C]_QTY Approximately how many units of <%LT_MEAS_x> were installed under the %PROGRAM program? An estimate is ok.

77	Record #	DEEMED_INSTALL_DATE_NU
8888	Refused	A3_OTH
9999	Don't know	A3_OTH

IF A3_QTY IN (88, 99)

A3[A-C]_OTH Would you say that the number of <%LT_MEAS_x> installed-are...

1	less than 10 units	DEEMED_INSTALL_DATE_NU

2	11 - 50 units	DEEMED_INSTALL_DATE_NU
3	50 - 100 units	DEEMED_INSTALL_DATE_NU
4	More than 100 units	DEEMED_INSTALL_DATE_NU
88	Refused	DEEMED_INSTALL_DATE_NU
99	Don't know	DEEMED_INSTALL_DATE_NU

IF ^UNRECORDED(DEEM_INSTALL_DATEx)

DEEM_INSTALL_DATEx_NU

Our records indicate that your organization <installed> ...<%LT_MEAS_x> on <%DEEM_INSTALL_DATEx>. _____Is this correct?

1	Yes	LI18
2	No	DEEM_INSTALL_YEAR
88	Refused	DEEM_INSTALL_YEAR
99	Don't know	DEEM_INSTALL_YEAR

IF UNRECORDED(DEEM_INSTALL_DATEx) & ^UNRECORDED(DEEM_PAID_DATEx)

DISPLAY

According to our records, your organization received a rebate for the installation> of ...<%LT_MEAS_x>... on <%DEEM_PAID_DATEx>.

IF DEEM_INSTALL_DATEx_NU in (2,88,99) | (UNRECORDED(DEEM_INSTALL_DATEx) & ^UNRECORDED(DEEM_PAID_DATEx))

DEEM_INSTALL_YEARx

In what year did you install <%LT_MEAS_x>? (PROBE FOR BEST GUESS)

1	2020	DEEM_INSTALL_MONTHx
2	2021	DEEM_INSTALL_MONTHx
88	Refused	LI18
99	Don't know	LI18

IF DEEM_INSTALL_YEARx in (1-3)

DEEM_INSTALL_MONTHx And what month? {If they cannot recall month, try to get the season.}

1	January	LI18
2	February	LI18
3	March	LI18
4	April	LI18
5	May	LI18
6	June	LI18
7	July	LI18
8	August	LI18
9	September	LI18
10	October	LI18
11	November	LI18
12	December	LI18
13	Fall	LI18
14	Winter	LI18
15	Spring	LI18
16	Summer	LI18
88	Refused	LI18
99	Don't know	LI18

If A3[A-C] is 1 or 2;

Ask only if CFLx = 1 and (LT_QTY_x > 1 | A3[A-C]_QTY > 1); else skip to LI181[A-C]

LI18[A-C] Of the CFLs you received through the program, what percentage do you estimate were placed into storage for later use?

77	Open Record	LI181

101	Refused	LI181
102	Don't know	LI181

Ask only if LEDx = 1 and (LT_QTY_x > 1 | A3[A-C]_QTY > 1); else skip to LI182[A-C]

LI181[A-C] Of the LEDs you received through the program, what percentage do you estimate were placed into storage for later use?

77	Open Record	LI182
101	Refused	LI182
102	Don't know	LI182

ASK ONLY IF LEDRLx = 1 and (LT_QTY_x > 1 | A3[A-C]_QTY > 1); else skip to LI183[A-C]

LI182[A-C] Of the LED Reflector Lamps you received through the program, what percentage do you estimate were placed into storage for later use?

77	Open Record	LI183
101	Refused	LI183
102	Don't know	LI183

ASK ONLY IF LEDOUTx = 1 and (LT_QTY_x > 1 | A3[A-C]_QTY > 1); else skip to LI184[A-C]

LI183[A-C] Of the LED Outdoor lighting you received through the program, what percentage do you estimate were placed into storage for later use?

77	Open Record	LI184
101	Refused	LI184
102	Don't know	LI184

ASK ONLY IF LEDINTx = 1 and (LT_QTY_x > 1 | A3[A-C]_QTY > 1); else skip to LI185[A-C]

LI184[A-C] Of the LED fixtures/lamps you received through the program, what percentage do you estimate were placed into storage for later use?

77	Open Record	LI185
101	Refused	LI185
102	Don't know	LI185

ASK ONLY IF LEDDOWNx = 1 and (LT_QTY_x > 1 | A3[A-C]_QTY > 1); else skip to LI19[A-C]

LI185[A-C] Of the LED Downlighting you received through the program, what percentage do you estimate were placed into storage for later use?

77	Open Record	LI19
101	Refused	LI19
102	Don't know	LI19

IF C5 <> 1 and (LT_QTY_x >1 | A3[A-C]_QTY > 1) ASK LI19[A-C]; else skip to LI190[A-C]

LI19[A-C] Were any of the program provided <%LT_MEAS_x> installed at another facility? If so, what percentage would you estimate?

77	Yes, #record percentage	LI190
101	Refused	LI190
102	Don't know	LI190

ASK ONLY IF LEDOUTx = 1

LI190[A-C] Where did you install the LED outdoor lighting that you received through the program? (ACCEPT MULTIPLE RESPONSES)

1	Parking lots	LI191
2	Garages	LI191
3	Walkways	LI191
4	Patios/Outdoor seating areas	LI191
5	Outside door	LI191
77	Other	LI191
88	Refused	LI191

99	Don't know	LI191

ASK ONLY IF LEDINTx = 1

LI191[A-C] Where did you install the LED fixtures/lamps that you received through the program? (ACCEPT MULTIPLE RESPONSES)

1	Open office	LI191a
2	Private office	LI191a
3	Hallway	LI191a
4	Lobby	LI191a
5	Stairwell	LI191a
6	Kitchen/Break area	LI191a
7	Restrooms	LI191a
8	Dining	LI191a
9	Retail space	LI191a
10	Conference room	LI191a
11	Warehouse	LI191a
12	Storage	LI191a
13	Outdoor	LI191a
14	Guest rooms	LI191a
15	Gymnasium	LI191a
77	Other	LI191a
88	Refused	LI191a
99	Don't know	LI191a

ASK ONLY IF LEDINTx = 1

ASK ONLY FOR RESPONSE CATEGORIES SELECTED IN QUESTION LI191[A-C]

IF ONLY ONE RESPONSE, THEN SET THAT RESPONSE TO 100%

If LI191[A-C] only equaled 88 or 99, then SKIP to LI191c

LI191a[A-C] What percentage of the LED lamps/fixtures were installed in each of these areas? (TOTAL SHOULD SUM TO 100%)

1	Open office	LI191c
2	Private office	LI191c
3	Hallway	LI191c
4	Lobby	LI191c
5	Stairwell	LI191c
6	Kitchen/Break area	LI191c
7	Restrooms	LI191c
8	Dining	LI191c
9	Retail space	LI191c
10	Conference room	LI191c
11	Warehouse	LI191c
12	Storage	LI191c
13	Outdoor	LI191c
14	Guest rooms	LI191c
15	Gymnasium	LI191c
77	Other	LI191c
888	Refused	LI191b
999	Don't know	LI191b

If LI191a[A-C] = 88 or 99 then Ask, else Skip to LI191c

LI191b[A-C] Where was the primary area where you installed the LED fixtures/lamps that you received through the program? (ACCEPT ONLY ONE RESPONSE)

1	Open office	LI191c
2	Private office	LI191c

3	Hallway	LI191c
4	Lobby	LI191c
5	Stairwell	LI191c
6	Kitchen/Break area	LI191c
7	Restrooms	LI191c
8	Dining	LI191c
9	Retail space	LI191c
10	Conference room	LI191c
11	Warehouse	LI191c
12	Storage	LI191c
13	Outdoor	LI191c
14	Guest rooms	LI191c
15	Gymnasium	LI191c
77	Other	LI191c
88	Refused	LI191c
99	Don't know	LI191c

LI191c[A-C] Of the LED fixtures/lamps you received through the program, are any of the lights being controlled by occupancy sensors, dimming or daylighting controls, or other types of controls? [If Yes, probe for which type; accept multiples]

1	No controls (i.e., manual on-off switches)	LI192
2	Occupancy Sensors	LI191d
3	Dimming Controls	LI191d
4	Daylighting Controls	LI191d
5	Energy Management System	LI191d
6	Dynamic lighting systems that vary energy input based on control settings	LI191d
77	Other specify	LI191d

88	Refused	LI192
99	Don't know	LI192

ASK ONLY FOR RESPONSE CATEGORIES SELECTED IN QUESTION LI191[A-C]

If LI191[A-C] only equaled 88 or 99, then SKIP to LI192

Else, IF ONLY ONE RESPONSE and LI191c[A-C] in (2,3,4,5,6,77), THEN SET THAT RESPONSE TO 1, and skip to LI192

LI191d[A-C] Of the areas you mentioned above where the lighting was installed, which of these areas were controlled.

1	Open office	LI192
2	Private office	LI192
3	Hallway	LI192
4	Lobby	LI192
5	Stairwell	LI192
6	Kitchen/Break area	LI192
7	Restrooms	LI192
8	Dining	LI192
9	Retail space	LI192
10	Conference room	LI192
11	Warehouse	LI192
12	Storage	LI192
13	Outdoor	LI192
14	Guest rooms	LI192
15	Gymnasium	LI192
77	Other	LI192
88	Refused	LI192
99	Don't know	LI192

ASK ONLY IF LEDDOWNx = 1

LI192[A-C] Where did you install the LED downlighting that you received through the program? (ACCEPT MULTIPLE RESPONSES)

1	Open office	LI20
2	Private office	LI20
3	Hallway	LI20
4	Lobby	LI20
5	Stairwell	LI20
6	Kitchen/Break area	LI20
7	Restrooms	LI20
8	Dining	LI20
9	Retail space	LI20
10	Conference room	LI20
11	Warehouse	LI20
12	Storage	LI20
13	Outdoor	LI20
14	Guest rooms	LI20
77	Other	LI20
88	Refused	LI20
99	Don't know	LI20

LI20[A-C] What type of lighting was removed and replaced when you installed <%LT_MEAS_x> through the program? [MULTIPLE RESPONSE]

1	High performance T8 (1" diameter bulbs)	LI22
2	T8 fluorescent fixtures (1” diameter bulbs)	LI22
3	T10 fluorescent fixtures	LI22
4	T12 Fixtures (1.5” diameter bulbs)	LI22

5	Compact HID (High Density Discharge) Fixtures	LI21
6	Screw-in Modular CFLs	LI22
7	Hardwire CFL Fixtures	LI22
8	Incandescent	LI22
9	CFL Exit Signs	LI22
10	LED Exit Signs	LI22
11	Halogen bulbs	LI22
12	Reflectors	LI22
13	Electronic Ballast	LI22
14	Magnetic Ballast	LI22
15	Manual Switches	LI22
16	Lighting Controls, Time Clock	LI22
17	Lighting Controls, Occupancy Sensor	LI22
18	Lighting Controls, Bypass/Delay Timers	LI22
19	Lighting Controls, Photocell	LI22
20	Other Fluorescent	LI22
21	Fat/Thick Tubes	LI22
22	Skinny/Thin Tubes	LI22
23	T5 Fixtures (5/8" diameter)	LI22
24	Screw-in LEDs	LI22
25	Screw-in LEDs Reflector Lamps	LI22
26	LED Fixtures or Panels (e.g., replacement for linear fixtures)	LI22
66	DID NOT REMOVE ANYTHING-ADDITIONAL EQUIP ONLY	NTGCHECK1
77	Other (PLEASE SPECIFY)	LI22

ASK IF LI20[A-C] = 5; else skip to LI22[A-C]

LI21[A-C] Were the HID lamps you removed High Pressure Sodium, Metal Halide, Mercury Vapor or Incandescent?

1	High pressure sodium	LI22
2	Metal Halide	LI22
3	Mercury Vapor	LI22
4	Incandescent	LI22
88	Refused	LI22
99	Don't know	LI22

If LI20[A-C]^= 66 then ask; else skip to end of DEEMED Loop

LI22[A-C] Approximately how old was the equipment that was removed and replaced? Would you say…

1	Less than 5 years old	LI23
2	Between 5 and 10 years old	LI23
3	Between 10 and 15 years old	LI23
4	More than 15 years old	LI23
88	Refused	LI23
99	Don't know	LI23

LI23[A-C] How would you describe the removed equipment's condition? Would you say they were in…

1	Poor condition	LI24
2	Fair condition	LI24
3	Good condition	LI24
88	Refused	LI24
99	Don’t know	LI24

ASK IF LT_QTY_x > 1 | A3[A-C]_QTY > 1

LI24[A-C] Approximately what percentage of the lighting equipment that was removed and replaced was broken or not working prior to installing <%LT_MEAS_x>?

%	Percent	LI30

101	Refused	LI30
102	Don't know	LI30

ASK IF LIGHTING=1

LI30 Considering all of the lighting changes we just discussed, approximately what percentage of the facility's lighting was affected by those changes?

%	Percent	HB1
101	Refused	HB1
102	Don't know	HB1

HIGH BAY

If LEDINTx = 1; else skip to DEL5

HB1 Thinking about all of the types of LED fixtures/lamps that were installed through the program, what is the highest height, in feet, above the area they light? [IN FEET] [PROBE FOR HEIGHT - 13 FEET OR HIGHER IS CONSIDERED HB AND WILL TRIGGER FOLLOW-UP QUESTIONS]

1	Record number of feet	HB2
88	Refused	HB2
99	Don't know	HB2

IF HB1 < 13 then ask; else skip to HB3

HB2 Just to double check, was any of the LED lighting installed through the program at a height of 13 or more feet above the area it is meant to light? This would qualify as HIGH BAY lighting.

1	Yes	HB3
2	No	DEL5
88	Refused	DEL5
99	Don't know	DEL5

ASKI IF (HB1 >> 12 & HB1 <> 88 & HB1 <> 99) | HB2(1)

HB3 What is the main kind of LED Fixture located at this height?

1	Linear LED (T-LED)	DEL5
2	Integrated LED Troffers	DEL5
3	Round LED High Bay (similar shape to an HID fixture)	DEL5
4	Panel LED	DEL5
77	OPEN\RECORD OTHER	DEL5
88	Refused	DEL5
99	Don't know	DEL5

DEL5 Is the amount of lighting better, worse, or the same than before your LED retrofit?

1	Better	DEL11
2	Worse	NEXT SECTION (NTG BATTERY)
3	Same	NEXT SECTION (NTG BATTERY)
88	Refused	DEL11
99	Don’t know	DEL11

If DEL5 in (1, 88, 99) then ask; else skip to NTG BATTERY

DEL11 Did you install additional lighting equipment to increase the amount of lighting in the LED retrofitted area(s)?

1	Yes	NEXT SECTION (NTG BATTERY)
2	No	
88	Refused	
99	Don’t know	

NET TO GROSS BATTERY

DISPLAY For the sake of expediency, during this next battery we will continue to refer to the MCE Commercial Upgrade program as THE PROGRAM and we will be referring to the installation of all your lighting fixtures as THE MEASURESx

IF MULTIPLE = 1, THEN ASK. ELSE AA3

A1b. Our records show that your organization installed more than one MEASURE through the <%UTILITY>'s <%PROGRAM> Program. They are … <%QTY_1> <%MEASURE1>, <%QTY_2> <%MEASURE2>, <%QTY_3> <%MEASURE3>. Was there a single decision making process for the installation of this equipment, or was there a separate decision making process for each type of equipment?

1	Single decision making process	AA3
2	Separate decision making process for each type of equipment	AA3
88	Refused	AA3
99	Don't know	AA3

AA3 There are usually a number of reasons why an organization like yours decides to participate in energy efficiency programs like this one. In your own words, can you tell me why you decided to participate in this program?

1	To replace old or outdated equipment	AA3a
2	As part of a planned remodeling, build-out, or expansion	N2
3	To gain more control over how the equipment was used	N2
4	Maintenance downtime/associated expenses for old equipment were too high	AA3a
5	Had process problems and were seeking a solution	N2
6	To improve equipment performance	N2
7	To improve production as a result of the change in equipment	N2
8	To comply with codes set by regulatory agencies	N2
9	To improve visibility/plant safety	N2

10	To comply with company policies regarding regular equipment retrofits or remodeling	AA3a
11	To get a rebate from the program	N2
12	To protect the environment	N2
13	To reduce energy costs	N2
14	To reduce energy use/power outages	N2
15	To update to the latest technology	N2
16	To improve the comfort level of the facility	N2
77	RECORD VERBATIM	N2
88	Don't know	N2
99	Refused	N2

IF AA3=1, 4 or 10 THEN ASK. ELSE N2

AA3a Had the equipment that you replaced reached the end of its useful life?

1	Yes	N2
2	No	N2
88	Refused	N2
99	Don't know	N2

N2 Did your organization make the decision to install this new equipment before after, or at the same time as you became aware of those rebates [IF NEEDED: to reduce the cost of the measure] were available through the PROGRAM?

1	Before	N3a
2	After	N3a
3	Same time	N3a
88	Refused	N3a
99	Don't know	N3a

DISPLAY Next, I'm going to ask you to rate the importance of the program as well as other factors that might have

influenced your decision to install this equipment. There are many equipment features that you may consider in your purchase decisions other than energy efficiency. These might include such features as the performance of the equipment or how well it fits into your space. However, in the following questions, we are interested specifically in how the program might or might not have affected your decisions about the energy efficiency of the equipment. That is, we are interested in what influenced you to choose the equipment you did rather than a less efficient version. Using a scale of 0 to 10 where 0 means not at all important and 10 means extremely important, how would you rate the importance of…

N3a The age or condition of the old equipment

#	Record 0 to 10 score (_____)	N3aa
88	Refused	N3b
99	Don't know	N3b

IF N3a > 5 and NTG_TYPE >= 2 THEN ASK

N3aa How, specifically, did this enter into your decision to install/delamp this equipment?

77	RECORD VERBATIM	N3b
88	Don't know	N3b
99	Refused	N3b

N3b Availability of the PROGRAM rebate [IF NEEDED: to reduce the cost of the measure]

#	Record 0 to 10 score (_____)	N3bb
88	Refused	N3c
99	Don't know	N3c

IF N3b > 7 AND NTG_TYPE >= 2, THEN ASK

N3bb Why do you give it this rating?

77	Record VERBATIM	N3D
88	Refused	N3D

99	Don't know	N3D

If V1 = 1 THEN ASK; ELSE SKIP TO N3e

N3d Recommendation from an equipment vendor that sold you the equipment and/or installed it for you **[VENDOR_1]**

#	Record 0 to 10 score (_____)	N3e
88	Refused	N3e
99	Don't know	N3e

N3e Your previous experience with similar types of energy efficient projects?

#	Record 0 to 10 score (_____)	N3f
88	Refused	N3f
99	Don't know	N3f

N3f Your previous experience with <%UTILITY>'s program or a similar utility program?

#	Record 0 to 10 score (_____)	N3g
88	Don't know	N3g
99	Refused	N3g

NTG_TYPE >= 1 THEN ASK, ELSE N3h –

N3g Information from the Program, Utility, or Program Administrator training course?

#	Record 0 to 10 score (_____)	N3gg
88	Refused	N3h
99	Don't know	N3h

IF N3g > 5, THEN ASK

N3gg What type of information was provided during the training?

77	Record VERBATIM	N3ggg

88	Refused	N3h
99	Don't know	N3h

N3ggg How, specifically, did this enter into your decision to install/delamp this equipment?

77	RECORD VERBATIM	N3h
88	Don't know	N3h
99	Refused	N3h

N3h Information from the Program, Utility, or Program Administrator Marketing materials?

#	Record 0 to 10 score (_____)	N3hh
88	Refused	N3j
99	Don't know	N3j

IF N3h > 5 and NTG_TYPE >= 1, THEN ASK

N3hh What type of information was provided that pertained to the PROJECT?

77	Record VERBATIM	N3hhh
88	Refused	N3j
99	Don't know	N3j

IF N3hh = 77, THEN ASK

N3hhh How, specifically, did this enter into your decision to install/delamp this energy efficient equipment?

77	RECORD VERBATIM	N3j
88	Don't know	N3j
99	Refused	N3j

IF NTG_TYPE >= 1

N3j Standard practice in your business/industry

#	Record 0 to 10 score (_____)	ACCT

88	Refused	ACCT
99	Don't know	ACCT

ACCT Did an MCE account representative or staff member inform you about the program?

1	Yes	N3i
2	No	N3i
88	Refused	N3i
99	Don't know	N3i

If ACCT = 1; ELSE SKIP TO N3m

N3I Endorsement or recommendation by your account representative or MCE staff?

#	Record 0 to 10 score (_____)	N3II
88	Refused	N3m
99	Don't know	N3m

IF N3I > 5 & NTG_TYPE >= 2 THEN ASK

N3II What did they recommend?

77	Record VERBATIM	N3III
88	Refused	N3m
99	Don't know	N3m

IF N3LL(77)

N3III How specifically did this enter into your decision to install this project using energy efficient equipment?

77	RECORD VERBATIM	N3m
88	Don't know	N3m
99	Refused	N3m

IF NTG_TYPE >= 1, ASK

N3m Corporate policy or guidelines

#	Record 0 to 10 score (_____)	N3mm
88	Refused	N3n
99	Don't know	N3n

IF N3m > 5, THEN ASK

N3mm How, specifically, did this enter into your decision to install/delamp this equipment?

77	RECORD VERBATIM	N3n
88	Don't know	N3n
99	Refused	N3n

N3n Payback or return on investment of installing this equipment

#	Record 0 to 10 score (_____)	N3o
88	Refused	N3o
99	Don't know	N3o

N3o Improved product quality

#	Record 0 to 10 score (_____)	N3oo
88	Refused	N3p
99	Don't know	N3p

IF N3o > 5, THEN ASK

N3oo How, specifically, did this enter into your decision to install/delamp this equipment?

77	RECORD VERBATIM	N3p
88	Don't know	N3p
99	Refused	N3p

IF FM050 = 12 AND NTG_TYPE >= 2, THEN ASK, ELSE SKIP TO N3r

N3p Compliance with state or federal regulations such as Title 24, air quality, OSHA, or FDA regulations

#	Record 0 to 10 score (_____)	N3pp
88	Refused	N3r
99	Don't know	N3r

IF N3p > 5, THEN ASK

N3pp How, specifically, did this enter into your decision to upgrade to energy efficient equipment?

77	RECORD VERBATIM	N3r
88	Don't know	N3r
99	Refused	N3r

ASK IF NTG_TYPE >= 1

N3r Compliance with your organization's normal remodeling or equipment replacement practices?

#	Record 0 to 10 score (_____)	N3rrr
88	Refused	N3s
99	Don't know	N3s

IF AA3(2|10)&N3R(6||10);

N3RRR According to your organization’s remodeling and equipment replacement policies, how often are you supposed to replace this type of equipment? [IF NEEDED: in terms of the number of years]

# yrs	Record Number of Years	N3rr
88	Refused	N3rr
99	Don't know	N3rr

IF N3r > 5, THEN ASK

N3rr How, specifically, did this enter into your decision to install/delamp this equipment?

77	RECORD VERBATIM	N3s.
88	Don't know	N3s.
99	Refused	N3s.

N3s Were there any other factors we haven't discussed that were influential in your decision to install/delamp this MEASURE?

1	Nothing else influential	CC1
77	Record verbatim	N3ss
88	Refused	CC1
99	Don't know	CC1

ASK IF N3s = 77

N3ss Using the same zero to 10 scale, how would you rate the influence of this factor?

#	Record 0 to 10 score (_____)	CC1
88	Refused	CC1
99	Don't know	CC1

CONSISTENCY CHECKS ON N3p, N3q and N3r

If NTG_TYPE >=2

IF AA3 = 8, AND N3p < 4, THEN ASK

CC1 You indicated earlier that compliance with codes or regulatory policies was one of the reasons you did the project. However, just now you scored the importance of compliance with state or federal regulations or standards such as Title 24, air quality, OSHA, or FDA regulations in your decision making fairly low, why is that?

77	RECORD VERBATIM	CC1a
88	Don't know	CC1a
99	Refused	CC1a

IF AA3 ^= 8, and N3p > 7, THEN ASK

CC1a You indicated earlier that compliance with codes or regulatory policies was not one of the primary reasons you did the project. However, just now you scored the importance of compliance with state or federal regulations or standards such as Title 24, air quality,

OSHA, or FDA regulations in your decision making fairly high, why is that?

77	RECORD VERBATIM	CC3
88	Don't know	CC3
99	Refused	CC3

IF AA3 = 2 or 10, AND N3r < 4, THEN ASK

NCC3 You indicated earlier that a regularly scheduled retrofit was one of the reasons you did the project. However, just now you scored the importance of compliance with your company's regularly scheduled retrofit or equipment replacement in your decision making fairly low, why is that?

77	RECORD VERBATIM	NCC3a
88	Don't know	NCC3a
99	Refused	NCC3a

IF AA3 ^= 2 and AA3 ^= 9 and AA3^=10 AND N3r > 7 THEN ASK

NCC3a You indicated earlier that a regularly scheduled retrofit was NOT one of the reasons you did the project. However, just now you scored the importance of compliance with your company's regularly scheduled retrofit or equipment replacement in your decision making fairly high, why is that?

77	RECORD VERBATIM	P1
88	Don't know	P1
99	Refused	P1

If INCENT <> 100 AND NTG_TYPE >= 1, THEN ASK; ELSE SKIP TO P3

P1 What financial calculations does your company typically make before proceeding with the installation of energy efficient equipment like you installed through the program?

1	Payback	P2A
2	Return on investment	P2B

77	Record VERBATIM	P3
88	Don't know	P3
99	Refused	P3

If P1 = 1 THEN ASK; ELSE SKIP TO P2B

P2A What is your threshold in terms of the payback or return on investment your company uses before deciding to proceed with installing energy efficient equipment like you installed through the program? Is it…

1	0 to 6 months	P3
2	6 months to 1 year	P3
3	1 to 2 years	P3
4	2 to 3 years	P3
5	3 to 5 years	P3
6	Over 5 years	P3
88	Don't know	P3
99	Refused	P3

IF P1 = 2 THEN ASK

P2B What is your ROI?

1	Record ROI____;	P3

P3 Did the rebate move your energy efficient equipment project within this acceptable range?

1	Yes	P4
2	No	P3a
88	Don't know	P3a

If P3 = 1 THEN ASK; ELSE SKIP TO P3A

P4 On a scale of 0 to 10, with a zero meaning NOT AT ALL IMPORTANT and 10 meaning Very Important, how important in your decision was it that the project was in the acceptable range?

#	Record 0 to 10 score (_____)	P3a
88	Refused	P3a
99	Don't know	P3a

CONSISTENCY CHECKS ON N3b and P3

IF P3 = 1, AND N3b < 5, THEN ASK

P3a The rebate seemed to make the difference between meeting your financial criteria and not meeting them, but you are saying that the rebate didn't have much effect on your decision, why is that?

77	Record VERBATIM	P3e
88	Don't know	P3e
99	Refused	P3e

IF P3 = 2, AND N3b > 5, THEN ASK

P3e The rebate didn't cause the installation of energy efficient equipment to meet your company's financial criteria, but you said that the rebate had an impact on the decision to install this energy efficient equipment. Why did it have an impact?

77	Record VERBATIM	N33
88	Don't know	N33
99	Refused	N33

IF N3D(8||10) | N3E(8||10) | N3F(8||10) | N3J(8||10) | N3M(8||10) | N3N(8||10) | N3O(8||10) | N3P(8||10) | N3R(8||10);

DISPLAY Next, with regard to your decision to implement this energy efficient MEASURE *instead of either less energy efficient or standard efficiency equipment*, I would like you to rate the importance of the PROGRAM as opposed to other Non-program factors that may have influenced your decision such as…(SCAN BELOW AND READ TO THEM THOSE FACTORS THAT INFLUENCED THEIR DECISION)

<u>Program Factors</u>
<%N3B> Availability of the PROGRAM rebate …@[%N3B>@

<%N3G> Information from the Program, Utility, or Program Administrator training course?	...@[%N3G>@
<%N3H> Information from the Program, Utility, or Program Administrator Marketing materials?	...@[%N3H>@
<%N3L> Endorsement or recommendation by your account rep?	...@[%N3L>@
Non-Program Factors	
<%N3D> Equipment Vendor recommendation	...@[%N3D>@
<%N3E> Previous experience with this measure	...@[%N3E>@
<%N3F> Previous experience with this program	...@[%N3F>@
<%N3J> Standard practice in your business/industry	...@[%N3J>@
<%N3M> Corporate policy or guidelines	...@[%N3M>@
<%N3N> Payback on investment.	...@[%N3N>@
<%N3O> To improve production as a result of lighting,	...@[%N3O>@
<%N3P> Compliance with state or federal regulations or standards such as Title 24, air quality, OSHA, or FDA regulations	...@[%N3P>@
<%N3R> Compliance with normal maintenance or retrocommissioning policies or your companies regularly scheduled retrofit or lighting replacement	...@[%N3R>@

DISPLAY If you were given 10 points to award in total, how many points would you give to the importance of the program and how many points would you give to these other non-program factors in choosing to go with energy-efficient equipment rather than a less efficient version of the equipment?

N41 How many of the ten points would you give to the importance of the PROGRAM in your decision?

#	Record 0 to 10 score (_____)	N42
88	Refused	N42
99	Don't know	N42

N42 and how many points would you give to all of these other non-program factors?

#	Record 0 to 10 score (_____)	N41P

88	Refused	N41P
99	Don't know	N41P

If N41 <> 88 and N41 <> 99 and N42 <> 88 and N42 <> 99, compute N41 + N42. While N41+N42 <> 10, display:

__We want these two sets of numbers to equal 10.

<%N41> for Program influence and

<%N42> for Non Program factors

DISPLAY

Next, I would like for you to consider the importance of the PROGRAM in your decision to install your equipment *at the time you did* rather than waiting to install new equipment sometime in the future, regardless of the actual efficiency of the equipment you selected. Please rate the importance of the program on this timing decision as opposed to other non-program factors that may have influenced your decision.

If Needed - else skip…

If you were given 10 points to award in total, how many points would you give to the importance of the program and how many points would you give to these other non-program factors in your decision to install your equipment at the time you did rather than waiting to install new equipment sometime in the future.

N41P

How many of the ten points would you give to the importance of the PROGRAM in your decision TO INSTALL YOUR EQUIPMENT AT THE TIME YOU DID?

#	Record 0 to 10 score (_____)	N42P
88	Refused	N42P
99	Don't know	N42P

N42P

and how many points would you give to all of these other non-program factors?

#	Record 0 to 10 score (_____)	REPLACE
88	Refused	REPLACE
99	Don't know	REPLACE

If N41P <> 88 and N41P <> 99 and N42P <> 88 and N42P <> 99, compute N41P + N42P. While N41P+N42P <> 10, display:

__We want these two sets of numbers to equal 10.

<%N41P> for Program influence and

<%N42P> for Non Program factors

ASK ALL

REPLACE Was the installation of this measure....<%NTGMEASURE> ...a replacement of existing equipment or was it additional equipment you installed in your facility?

1	Replace/Modification/Retrofit	DISPLAY
2	Add-on	DISPLAY
88	Refused	DISPLAY
99	Don't know	DISPLAY

DISPLAY Now I would like you to think about the action you would have taken with regard to the installation of this equipment if the program had not been available.

IF REPLACE(1)

N5 Using a likelihood scale from 0 to 10, where 0 is not at all likely and 10 is extremely likely, if THE PROGRAM had NOT BEEN AVAILABLE, what is the likelihood that you would have installed exactly the same program-qualifying energy efficient equipment that you did for this project regardless of when you would have installed it?

#	Record 0 to 10 score (_____)	N5a
88	Refused	N5B
99	Don't know	N5B

IF REPLACE(2) THEN ASK; ELSE SKIP TO N6

N5aa Using a likelihood scale from 0 to 10, where 0 is Not at all likely and 10 is Extremely likely, if THE PROGRAM had NOT BEEN AVAILABLE, what is the likelihood that you would have installed exactly the same energy efficient equipment at the same time as you did?

#	Record 0 to 10 score (_____)	N6
88	Don't know	N6
99	Refused	N6

CONSISTENCY CHECKS

IF N3b > 7 and N5 > 7, THEN ASK

When you answered ...<%N3B> ... for the question about the influence of the rebate, I would interpret that to mean that the rebate was quite important to your decision to install. Then, when you answered ..<%N5>... for how likely you would be to install the same equipment **without** the rebate, it sounds like the rebate was not very important in your installation decision.
I want to check to see if I am misunderstanding your answers or if the questions may have been unclear. Will you explain in your own words, the role the rebate played in your decision to install this efficient equipment?

N5a

77	Record VERBATIM	NN5aa
88	Don't know	NN5aa
99	Refused	NN5aa

Would you like for me to change your score on the importance of the rebate that you gave a rating of <%N3B> and/or change your rating on the likelihood you would install the same equipment without the rebate which you gave a rating of <%N5> and/or we can change both if you wish?

NN5aa

1	No change	N5b
77	Record how they would rate rebate influence and how they would rate likelihood to install without the rebate	N5b
88	Don't know	N5b
99	Refused	N5b

ASK IF REPLACE(1)

Using the same scale as before, if the program had not been available, what is the likelihood that you would have done this project at the same time as you did?

N5b

#	Record 0 to 10 score (_____)	N5bb
88	Refused	N5bb
99	Don't know	N5bb

If N5b < 9 THEN ASK; ELSE SKIP TO N6

N5bb Why do you say that?

77	Record VERBATIM	N6
88	Don't know	N6
99	Refused	N6

ADDITIONAL BASELINE INPUT

N6 Now I would like you to think one last time about what action you would have taken if the program had not been available. Which of the following alternatives would you have been MOST likely to do?

1	Install/Delamped fewer units	N6aa
2	Install standard efficiency equipment or whatever required by code	N6aa
3	Installed equipment more efficient than code but less efficient than what you installed through the program	N6aa
4	Done nothing (keep existing equipment as is)	N6ba
5	Done the same thing I would have done as I did through the program	N6aa
6	Repair/rewind or overhaul the existing equipment	N7
77	Something else (specify what _____)	N6ca
88	Don't know	N6ca
99	Refused	N6ca

If N6 = 1,2,3,5 ASK, ELSE N6ba

N6aa Would you have [FILL IN RESPONSE TO N6 for N6 = 1,2, 3, 5] at the same time as you did under the program, within a year, or at a later time?

1	Same time	N7

2	Within one year	N7
3	At a later time	N6ab
88	Don't know	N7
99	Refused	N7

N6ab How many years later would it have been?

77	Record VERBATIM	N7
88	Don't know	N6ac
99	Refused	N7

N6ac Would it have been....

1	Less than one year	N7
2	About a year	N7
3	A couple of years	N7
4	A few years	N7
5	More than four years	N7
88	Don't know	N7
99	Refused	N7

If N6 = 4 THEN ASK, ELSE N6ca

N6ba How long would you have waited to replace your equipment?

1	Less than one year	N7
2	About a year	N7
3	A couple of years	N7
4	A few years	N7
5	More than four years	N7
88	Don't know	N7
99	Refused	N7

IF N6=77, 88, 99 THEN ASK, ELSE N7

N6ca Would you still have replaced your equipment at the same time as you did under the program, within a year, or at a later time?

1	Same time	N7
2	Within one year	N7
3	At a later time	N6cb
88	Don't know	N7
99	Refused	N7

N6cb How many years later would it have been?

77	Record VERBATIM	N6
88	Don't know	N6cc
99	Refused	N6

N6cc Would it have been....

1	Less than one year	N7
2	About a year	N7
3	A couple of years	N7
4	A few years	N7
5	More than four years	N7
88	Don't know	N7
99	Refused	N7

CONSISTENCY CHECK

Ask if N6 = (1, 2, 3, 4) and ((N5 > 8 and N5b > 8) OR N5aa > 8)

N7 In an earlier response, you said that if the program had not been available, there was a very high likelihood that you would have installed exactly the same equipment as you did through the program. However, just now you have indicated that you would not have installed the same equipment as you did without the benefit of the

program. Can you explain to me why there is this difference?

77	Record VERBATIM	N6a
88	Don't know	N6a
99	Refused	N6a

Ask if N6(1);

N6a How many fewer units would you have installed/Delamped? (It is okay to take an answer such as ...HALF...or 10 percent fewer ... etc.)

77	RECORD VERBATIM	ER2
88	Refused	ER2
99	Refused	ER2

Ask if N6(3);

N6b Can you tell me what model or efficiency level you were considering as an alternative? (It is okay to take an answer such as ... 10 percent more efficient than code or 10 percent less efficient than the program equipment)

77	RECORD VERBATIM	ER2
88	Don't know	ER2
99	Refused	ER2

Ask if N6(6);

N6c How long do you think the repaired equipment would have lasted before requiring replacement?

77	RECORD VERBATIM	ER2
88	Don't know	ER2
99	Refused	ER2

EARLY REPLACEMENT BATTERY -

[IF N5b < 8 and A3 = 1, 4, 8, or 10 THEN ASK. ELSE SKIP TO PP1]

DISPLAY	Earlier, when I asked you a question about why you decided to implement the project using high efficiency equipment, you gave reasons related to <A3> Now I would like to ask you some follow up questions regarding these responses you gave me.	ER2

IF REPLACE(1) AND N6c IS UNRECORDED;

ER2	How many more years do you think your equipment would have gone before failing and required replacement?

77	___ Estimated Remaining Useful Life (in years)	ER6
88	Don't know	ER6
99	Refused	ER6

IF AA3 = 4, THEN ASK

ER6	How much downtime did you experience in the past year?

77	_____Downtime Estimate (in weeks)	ER9
88	Don't know	ER9
99	Refused	ER9

ER9	In your opinion, based on the economics of operating this equipment, for how many more years could you have kept this equipment functioning?

Yrs	___ Estimated Remaining Useful Life	ER15
88	Don't know	ER15
99	Refused	ER15

IF AA3 = 8, THEN ASK

ER15	Can you briefly describe the specific code/regulatory requirements that this project addressed?

77	RECORD VERBATIM	ER19
88	Don't know	ER19
99	Refused	ER19

IF AA3 = 10, THEN ASK

ER19 Can you briefly describe the specific company policies regarding regular/normal maintenance/replacement policy(ies) that were relevant to this project? Or briefly describe the specific company policies regarding regular equipment retrofits and remodeling?

77	RECORD VERBATIM	ARQ1
88	Don't know	ARQ1
99	Refused	ARQ1

Ask All

ARQ1 How would you describe the trends in your lighting maintenance and repair costs over the past 5 years? Would you say that costs have been…

1	Increasing over the past 5 years	ARQ2
2	Holding Steady	ARQ2
3	Going Down	ARQ2
88	Don't know	ARQ2
99	Refused	ARQ2

ARQ2 Were you actively planning a space renovation or lighting upgrade or major repair prior to contact with the program?

1	Yes	ARQ3
2	No	ARQ3
88	Don't know	ARQ3
99	Refused	ARQ3

ARQ3 If you had not replaced your lighting under the program, how long do you think you would have waited to replace your lighting system? Would you have….

1	Replaced old fixtures one at a time as they failed, but never have done a full system change out	PP1
2	Done a full system change out within a year of when you installed the new equipment under the program	PP1

3	Done a full system change out in 1 to 3 years	PP1
4	Done a full system change out in 4 years or later	PP1
88	Don't know	PP1
99	Refused	PP1

PROCESS QUESTIONS - ASK ALL

PP1 What do you believe the PROGRAM'S primary strengths are?

77	Record VERBATIM	PP2
88	Don't know	PP2
99	Refused	PP2

PP2 What concerns do you have about the PROGRAM, if any? (IF NEEDED: What do you view as the primary features that need to be improved?)

77	Record VERBATIM	PP4
88	Don't know	PP4
99	Refused	PP4

PP4 On a scale of 0 - 10, where 0 is completely dissatisfied and 10 is completely satisfied, how would you rate your OVERALL satisfaction with the <%PROGRAM>?

#	Record 0 to 10 score (_____)	PP5
88	Refused	PP5
99	Don't know	PP5

IF PP4 < 4 THEN ASK; ELSE SKIP TO LT2

PP5 Why do you say that?

77	Record VERBATIM	LT2
88	Don't know	LT2
99	Refused	LT2

LONG TERM INFLUENCE

IF N3f > 4, THEN ASK, ELSE GO TO OPERATING HOURS SECTION

DISPLAY Now I'd like you to think about your organization's experiences with %UTILITY's energy efficiency programs and efforts over the longer term, for example, over the past 5, 10, or even 20 years.
In an earlier question, you indicated that your previous experience with utility energy efficiency programs was a factor that influenced your decision to implement this PROJECT. I would like to ask you a few questions about this experience. LT2

LT2 For how many years have you been participating in %UTILITY's energy efficiency programs?

# yrs	Record Number of Years	LT3
88	Refused	LT3
99	Don't know	LT3

LT3 During this time, how many times has your organization participated in these PROGRAM(s)?

1	7 to 10 times, or more	CA6
2	4 to 7 times	CA6
3	2 to 4 times	CA6
4	less than 2 times	CA6
88	Refused	LT6
99	Don't know	LT6

IF LT3(1||4);

CA6 What type of equipment did you install through this (these) program(s)? [READ RESPONSE CATEGORIES]

1	Indoor lighting	LT6
2	Cooling equipment	LT6
3	Natural gas equipment, such as water heater, furnace or appliances	LT6
4	Insulation or windows	LT6

5	Refrigeration	LT6
6	Industrial process equipment	LT6
7	Greenhouse heat curtains	LT6
8	Food service equipment	LT6
77	OPEN/SOMETHING OTHER (specify)	LT6
88	Refused	LT6
99	Don't Know	LT6

LT6 What factors led you to participate in these program(s)?

77	Record VERBATIM	LT7
88	Refused	LT7
99	Don't know	LT7

LT7 And exactly how did that experience help to convince you to install this energy efficient equipment?

77	Record VERBATIM	LT8
88	Refused	LT8
99	Don't know	LT8

IF LT3 = 1 or 2, THEN ASK. ELSE GO TO OPERATING HOURS SECTION

LT8 Have these programs had any long-term influence on your organization's energy efficiency related practices and policies that go beyond the immediate effect of incentives on individual projects? [DO NOT READ: Examples are causing them to add energy efficiency procurement policies, internal incentive or reward structures for improving energy efficiency, or adoption of energy management best practices.]

1	Yes	MULTI-SITE
2	No	MULTI-SITE
88	Refused	MULTI-SITE
99	Don't know	MULTI-SITE

IF <%ADDITIONAL_SITES> = 0 then skip to ALWAYS

MULTI_SITE Our records indicate that in addition to the location we have been discussing, your organization also installed LED lighting equipment through an energy efficiency program at approximately **<%ADDITIONAL_SITES>** other locations. Is that correct?

1	Yes	MULTI-SITE_2
2	No	COV1
88	Refused	COV1
99	Don't know	COV1

MULTI_SITE_2 Are the responses you provided earlier about the influence of the program on your decision making and actions you would have taken if the program was not available, also applicable to the LED lighting equipment that was installed at these other locations?

1	Yes	COV1
2	No	COV1
88	Refused	COV1
99	Don't know	COV1

OPERATING HOURS

DISPLAY We'd like to ask a few questions about how the COVID-19 pandemic may have affected your organization's operation hours.

COV_1 Were your organization's operation hours affected by the COVID-19 pandemic over the past couple of years?

1	Yes	COV_2
2	No	ALWAYS
88	Refused	COV_2
99	Don't Know	COV_2

COV_2 Are your organization's operation hours back to what you would consider to be normal?

1	Yes	COV_2_YearX
2	No	COV_3
88	Refused	COV_3
99	Don't Know	COV_3

COV_2_YEARx Approximately when would you say your operation hours returned to normal? [best guess of month and year]

COV_2_YEARx Year (PROBE FOR BEST GUESS)

1	2020	COV_2_Monthx
2	2021	COV_2_Monthx
3	2022	COV_2_Monthx
88	Refused	COV_4
99	Don't know	COV_4

IF DEEM_INSTALL_YEARx in (1-3)

COV_2_MONTHx And what month? {If they cannot recall month, try to get the season.}

1	January	COV_4
2	February	COV_4
3	March	COV_4
4	April	COV_4
5	May	COV_4
6	June	COV_4
7	July	COV_4
8	August	COV_4
9	September	COV_4
10	October	COV_4
11	November	COV_4
12	December	COV_4

13	Fall	COV_4
14	Winter	COV_4
15	Spring	COV_4
16	Summer	COV_4
88	Refused	COV_4
99	Don't know	COV_4

COV_3 Do you expect your organization's operation hours to return to normal in the next year?

1	Yes	COV_3_Months
2	No	COV_3_open
88	Refused	COV_3_open
99	Don't know	COV_3_open

COV_3_Months In approximately how many months do you expect your operation hours to return to normal?

1	Record # months	COV_3_open
77	Less than 1 month	COV_3_open
88	Refused	COV_3_open
99	Don't know	COV_3_open

COV_3_open How are your current hours of operation different than what you expect them to be when they are back to normal?

77	Open Record	COV_4
88	Refused	COV_4
99	Don't know	COV_4

COV_4 During the COVID-19 pandemic, was your organization fully closed for any period of time?

1	Yes	COV_4a
2	No	COV_5

88	Refused	COV_5
99	Don't know	COV_5

COV_4a For approximately how many months was your organization fully closed?

1	Record # months	COV_5
77	Less than 1 month	COV_5
88	Refused	COV_5
99	Don't know	COV_5

COV_5 During the COVID-19 pandemic, were your organization's hours of operation significantly reduced while you remained open?

1	Yes	COV_5a
2	No	ALWAYS
88	Refused	ALWAYS
99	Don't know	ALWAYS

COV_5a In what way were your organization's hours of operation reduced during this time?

1	Record Open	COV_5b
88	Refused	COV_5b
99	Don't know	COV_5b

COV_5b For approximately how many months did this reduction in operating hours occur?

1	Yes	ALWAYS
2	No	ALWAYS
88	Refused	ALWAYS
99	Don't know	ALWAYS

ALWAYS

IF COV_3 = 1 then DISPLAY: The next few questions are to help us get a full understanding of your organization's operational hours. They are focused on what you expect your typical operating hours to be when your organization returns back to normal operation.

ELSE DISPLAY: The next few questions are to help us get a full understanding of your organization's operational hours. They are focused on your current typical operating hours.

ALWAYS Is your organization operation 24 hours a day, 7 days a week?

1	Yes	HOLIDAYS
2	No	HOLIDAYS
88	Refused	HOLIDAYS

HOLIDAYS Does your facility close for any holidays during the year? If so, which one(s)?

1	New Year's Day - January 1	DAYS
2	Martin Luther King Jr. Day - (3rd Monday in January)	DAYS
3	President's Day - (3rd Monday in February)	DAYS
4	Memorial Day - (Last Monday in May)	DAYS
5	Independence Day - July 4th (Or Surrounding Monday/Friday if July 4 is a weekend)	DAYS
6	Labor Day - (First Monday in September)	DAYS
7	Thanksgiving - (4th Thursday in November)	DAYS
8	Day after Thanksgiving	DAYS
9	Christmas Eve - December 24	DAYS
10	Christmas Day - December 25	DAYS
66	NO HOLIDAY CLOSURES	DAYS
77	Other - Specify	DAYS
88	Refused	DAYS
99	Don't Know	DAYS

Ask if ALWAYS = 2 or 88; else skip to CUSTOMER CHARACTERISTICS;

Is your facility closed any of the 7 days of the week?
DAYS If so, which days are you CLOSED?

1	Monday	MONDAY_OPEN
2	Tuesday	MONDAY_OPEN
3	Wednesday	MONDAY_OPEN
4	Thursday	MONDAY_OPEN
5	Friday	MONDAY_OPEN
6	Saturday	MONDAY_OPEN
7	Sunday	MONDAY_OPEN
66	Open EVERYDAY	MONDAY_OPEN
88	REFUSED	MONDAY_OPEN
99	DON'T KNOW	MONDAY_OPEN

Ask if ALWAYS(2 or 88)&^DAYS(1); else skip to TUESDAY_OPEN;

MONDAY_OPEN What time did you open your facility on MONDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	MONDAY_CLOSE
88	REFUSED	MONDAY_CLOSE
99	DON'T KNOW	MONDAY_CLOSE

IF MONDAY_OPEN(1||64)

MONDAY_CLOSE What time did you close your facility on MONDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	TUESDAY_OPEN
88	REFUSED	TUESDAY_OPEN
99	DON'T KNOW	TUESDAY_OPEN

Ask if ALWAYS(2 or 88)&^DAYS(2); else skip to WEDNESDAY_OPEN;

TUESDAY_OPEN What time did you open your facility on TUESDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	TUESDAY_CLOSE
88	REFUSED	TUESDAY_CLOSE
99	DON'T KNOW	TUESDAY_CLOSE

IF TUESDAY_OPEN(1||65)

TUESDAY_CLOSE What time did you close your facility on TUESDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	WEDNESDAY_OPEN
88	REFUSED	WEDNESDAY_OPEN
99	DON'T KNOW	WEDNESDAY_OPEN

Ask if ALWAYS(2 or 88)&^DAYS(3); else skip to THURSDAY_OPEN;

WEDNESDAY_OPEN What time did you open your facility on WEDNESDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	WEDNESDAY_CLOSE
88	REFUSED	WEDNESDAY_CLOSE
99	DON'T KNOW	WEDNESDAY_CLOSE

IF WEDNESDAY_OPEN(1||65)

WEDNESDAY_CLOSE What time did you close your facility on WEDNESDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	THURSDAY_OPEN
88	REFUSED	THURSDAY_OPEN
99	DON'T KNOW	THURSDAY_OPEN

Ask if ALWAYS(2 or 88)&^DAYS(4); else skip to FRIDAY_OPEN;

THURSDAY_OPEN What time did you open your facility on THURSDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	THURSDAY_CLOSE
88	REFUSED	THURSDAY_CLOSE
99	DON'T KNOW	THURSDAY_CLOSE

IF THURSDAY_OPEN(1||65)

THURSDAY_CLOSE What time did you close your facility on THURSDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	FRIDAY_OPEN
88	REFUSED	FRIDAY_OPEN
99	DON'T KNOW	FRIDAY_OPEN

Ask if ALWAYS(2 or 88)&^DAYS(5); else skip to SATURDAY_OPEN;

FRIDAY_OPEN What time did you open your facility on FRIDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	FRIDAY_CLOSE
88	REFUSED	FRIDAY_CLOSE
99	DON'T KNOW	FRIDAY_CLOSE

IF FRIDAY_OPEN(1||65)

FRIDAY_CLOSE What time did you close your facility on FRIDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	SATURDAY_OPEN
88	REFUSED	SATURDAY_OPEN
99	DON'T KNOW	SATURDAY_OPEN

Ask if ALWAYS(2 or 88)&^DAYS(6); else skip to SUNDAY_OPEN;

SATURDAY_OPEN What time did you open your facility on SATURDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	SATURDAY_CLOSE
88	REFUSED	SATURDAY_CLOSE

99	DON'T KNOW	SATURDAY_CLOSE

IF SATURDAY_OPEN(1||65)

SATURDAY_CLOSE What time did you close your facility on SATURDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	SUNDAY_OPEN
88	REFUSED	SUNDAY_OPEN
99	DON'T KNOW	SUNDAY_OPEN

Ask if ALWAYS(2 or 88)&^DAYS(7); else skip to DIFF_SCHEDULE;

SUNDAY_OPEN What time did you open your facility on SUNDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	SUNDAY_CLOSE
88	REFUSED	SUNDAY_CLOSE
99	DON'T KNOW	SUNDAY_CLOSE

IF SUNDAY_OPEN(1||65)

SUNDAY_CLOSE What time did you close your facility on SUNDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	DIFF_SCHEDULE
88	REFUSED	DIFF_SCHEDULE
99	DON'T KNOW	DIFF_SCHEDULE

DIFF_SCHEDULE Some facilities have different schedules for certain times of the year. Does your organization maintain a different schedule for certain months of the year?

1	Yes	MONTHS
2	No	LGT_SCHD_1
88	REFUSED	LGT_SCHD_1
99	DON'T KNOW	LGT_SCHD_1

Ask if DIFF_SCHEDULE = 1; Else skip to LGT_SCHD_1;

MONTHS During which months of the year did the schedule vary from the times I just recorded?

1	January	ALT_ALWAYS
2	February	ALT_ALWAYS
3	March	ALT_ALWAYS
4	April	ALT_ALWAYS
5	May	ALT_ALWAYS
6	June	ALT_ALWAYS
7	July	ALT_ALWAYS
8	August	ALT_ALWAYS
9	September	ALT_ALWAYS
10	October	ALT_ALWAYS
11	November	ALT_ALWAYS
12	December	ALT_ALWAYS
88	REFUSED	ALT_ALWAYS
99	DON'T KNOW	ALT_ALWAYS

ALT_ALWAYS Was your organization operation 24 hours a day, 7 days a week?

1	Yes	LGT_SCHD_1
2	No	ALT_DAYS
88	Refused	ALT_DAYS

If ^ALT_ALWAYS(1) then ask; Else SKIP to LGT_SCHD_1;

ALT_DAYS During this alternate schedule, was your facility closed any of the 7 days of the week? If so, which days were you CLOSED?

1	Monday	ALT_MONDAY_OPEN
2	Tuesday	ALT_MONDAY_OPEN

3	Wednesday	ALT_MONDAY_OPEN
4	Thursday	ALT_MONDAY_OPEN
5	Friday	ALT_MONDAY_OPEN
6	Saturday	ALT_MONDAY_OPEN
7	Sunday	ALT_MONDAY_OPEN
66	Open EVERYDAY	ALT_MONDAY_OPEN
88	REFUSED	ALT_MONDAY_OPEN
99	DON'T KNOW	ALT_MONDAY_OPEN

Ask if DIFF_SCHEDULE(1)&^ALT_DAYS(1); else skip to ALT_TUESDAY_OPEN;

ALT_MONDAY_OPEN For the alternate schedule, what time did you open your facility on MONDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	ALT_MONDAY_CLOSE
88	REFUSED	ALT_MONDAY_CLOSE
99	DON'T KNOW	ALT_MONDAY_CLOSE

IF ALT_MONDAY_OPEN(1||64)

ALT_MONDAY_CLOSE What time did you close your facility on MONDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	ALT_TUESDAY_OPEN
88	REFUSED	ALT_TUESDAY_OPEN
99	DON'T KNOW	ALT_TUESDAY_OPEN

Ask if DIFF_SCHEDULE(1)&^ALT_DAYS(2); else skip to ALT_WEDNESDAY_OPEN;

ALT_TUESDAY_OPEN What time did you open your facility on TUESDAY during your alternate schedule?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	ALT_TUESDAY_CLOSE
88	REFUSED	ALT_TUESDAY_CLOSE

99	DON'T KNOW	ALT_TUESDAY_CLOSE

IF ALT_TUESDAY_OPEN(1||65)

ALT_TUESDAY_CLOSE What time did you close your facility on TUESDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	ALT_WEDNESDAY_OPEN
88	REFUSED	ALT_WEDNESDAY_OPEN
99	DON'T KNOW	ALT_WEDNESDAY_OPEN

Ask if DIFF_SCHEDULE(1)&^ALT_DAYS(3); else skip to ALT_THURSDAY_OPEN;

ALT_WEDNESDAY_OPEN What time did you open your facility on WEDNESDAY during your alternate schedule?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	ALT_WEDNESDAY_CLOSE
88	REFUSED	ALT_WEDNESDAY_CLOSE
99	DON'T KNOW	ALT_WEDNESDAY_CLOSE

IF ALT_WEDNESDAY_OPEN(1||65)

ALT_WEDNESDAY_CLOSE What time did you close your facility on WEDNESDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	ALT_THURSDAY_OPEN
88	REFUSED	ALT_THURSDAY_OPEN
99	DON'T KNOW	ALT_THURSDAY_OPEN

Ask if DIFF_SCHEDULE(1)&^ALT_DAYS(4); else skip to ALT_FRIDAY_OPEN;

ALT_THURSDAY_OPEN What time did you open your facility on THURSDAY during your alternate schedule?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	ALT_THURSDAY_CLOSE
88	REFUSED	ALT_THURSDAY_CLOSE
99	DON'T KNOW	ALT_THURSDAY_CLOSE

ALT_THURSDAY_OPEN(1||65)

ALT_THURSDAY_CLOSE What time did you close your facility on THURSDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	ALT_FRIDAY_OPEN
88	REFUSED	ALT_FRIDAY_OPEN
99	DON'T KNOW	ALT_FRIDAY_OPEN

Ask if DIFF_SCHEDULE(1)&^ALT_DAYS(5); else skip to ALT_SATURDAY_OPEN;

ALT_FRIDAY_OPEN What time did you open your facility on FRIDAY during this alternate schedule?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	ALT_FRIDAY_CLOSE
88	REFUSED	ALT_FRIDAY_CLOSE
99	DON'T KNOW	ALT_FRIDAY_CLOSE

IF ALT_FRIDAY_OPEN(1||65)

ALT_FRIDAY_CLOSE What time did you close your facility on FRIDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	ALT_SATURDAY_OPEN
88	REFUSED	ALT_SATURDAY_OPEN
99	DON'T KNOW	ALT_SATURDAY_OPEN

Ask if DIFF_SCHEDULE(1)&^ALT_DAYS(6); else skip to ALT_SUNDAY_OPEN;

ALT_SATURDAY_OPEN I recorded that during your alternate schedule you were also open on Saturday. What time did you open your facility on SATURDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	ALT_SATURDAY_CLOSE
88	REFUSED	ALT_SATURDAY_CLOSE
99	DON'T KNOW	ALT_SATURDAY_CLOSE

IF ALT_SATURDAY_OPEN(1||65)

ALT_SATURDAY_CLOSE What time did you close your facility on SATURDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	ALT_SUNDAY_OPEN
88	REFUSED	ALT_SUNDAY_OPEN
99	DON'T KNOW	ALT_SUNDAY_OPEN

Ask if DIFF_SCHEDULE(1)&^ALT_DAYS(7); else skip to LGT_SCHD_1;

ALT_SUNDAY_OPEN I recorded that during your alternate schedule you were also open on Sunday. What time did you open your facility on SUNDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	ALT_SUNDAY_CLOSE
88	REFUSED	ALT_SUNDAY_CLOSE
99	DON'T KNOW	ALT_SUNDAY_CLOSE

IF ALT_SUNDAY_OPEN(1||65)

ALT_SUNDAY_CLOSE What time did you close your facility on SUNDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	LGT_SCHD_1
88	REFUSED	LGT_SCHD_1
99	DON'T KNOW	LGT_SCHD_1

LGT_SCHD_1 Did ALL of the new lighting equipment generally operate in tandem with the facility schedule you just provided?

PROBE AS NEEDED:

That is, the lights generally got turned on when the facility opened and got shut off when the facility closed ==> ANSWER: Yes.

Or is the schedule of operation instead different for some of the new lighting equipment due to schedule differences for certain areas in the facility or other factors ==> ANSWER: No.

1	Yes	LGT_SCHD_2

2	No	LGT_AA1_1
88	REFUSED	LGT_AA1_1
99	DON'T KNOW	LGT_AA1_1

LGT_SCHD_2

Thinking about how lights operated on average across all the different areas of the facility, what percent of the new lighting equipment would generally be illuminated during the hours the facility was open?

That is, what percentage of the new lighting would be turned on when the facility was open, on average?

	ENTER PERCENTAGE_____	LGT_SCHD_3
888	REFUSED	LGT_SCHD_3
999	DON'T KNOW	LGT_SCHD_3

LGT_SCHD_3

Now thinking about when the facility is closed; what percentage of the new lighting would still be turned on, even though the facility was closed?

	ENTER PERCENTAGE_____	CC2A
888	REFUSED	CC2A
999	DON'T KNOW	CC2A

LGT_AA1_1

Thinking only about the new **<%LT_MEAS_1>** that was installed, did this lighting generally operate in tandem with the facility schedule you just provided?

PROBE AS NEEDED:

That is, did the **<%LT_MEAS_1>** that was installed generally get turned on when the facility opened and get shut off when the facility closed ==> ANSWER: Yes.

Or was the schedule of operation instead different for the **<%LT_MEAS_1>** that was installed ==> ANSWER: No.

1	Yes	LGT_AA2_1

2	No	LGT_AA2_1
88	REFUSED	LGT_AA2_1
99	DON'T KNOW	LGT_AA2_1

IF LT_MEAS_2 missing, then Skip to LGT_AA1_2

LGT_AA2_1

Now, thinking only about the new **<%LT_MEAS_2>**that was installed , did this lighting generally operate in tandem with the facility schedule you just provided?

PROBE AS NEEDED:

That is, did the **<%LT_MEAS_2>** installed get turned on when the facility opened and get shut off when the facility closed ==> ANSWER: Yes.

Or was the schedule of operation instead different for the **<%LT_MEAS_2>** ==> ANSWER: No.

1	Yes	LGT_AA1_2
2	No	LGT_AA1_2
88	REFUSED	LGT_AA1_2
99	DON'T KNOW	LGT_AA1_2

IF LGT_AA1_1 = 1 THEN ASK, ELSE SKIP TO LGT AA2_2

LGT_AA1 _2

Thinking only about the new **<%LT_MEAS_1>** that was installed what percentage of this new lighting would be turned on when the facility was open, on average?

	ENTER PERCENTAGE_____	LGT_AA1_3
888	REFUSED	LGT_AA1_3
999	DON'T KNOW	LGT_AA1_3

LGT_AA1_3

Thinking about when the facility is closed; what percentage of the new **<%LT_MEAS_1>** that was installed would still be turned on, even though the facility was closed?

	ENTER PERCENTAGE_____	LGT_AA2_2

888	REFUSED	LGT_AA2_2
999	DON'T KNOW	LGT_AA2_2

IF LGT_AA2_1 = 1 THEN ASK, ELSE SKIP TO ALWAYS_AA1

LGT_AA2 _2 Thinking only about the new **<%LT_MEAS_2>**, what percentage of this new lighting would be turned on when the facility was open, on average?

	ENTER PERCENTAGE_____	LGT_AA2_3
888	REFUSED	LGT_AA2_3
999	DON'T KNOW	LGT_AA2_3

LGT_AA2_3 Thinking about when the facility is closed; what percentage of the new **<%LT_MEAS_2>**, would still be turned on, even though the facility was closed?

	ENTER PERCENTAGE_____	ALWAYS AA_1
888	REFUSED	ALWAYS AA_1
999	DON'T KNOW	ALWAYS AA_1

Ask if LGT_AA1_1 = (2, 88 or 99); else skip to SAME_AA1_AA2;

ALWAYS_AA1 Now we'd like you to think about lighting schedules in the facility that DO NOT coincide with the facility schedule of operation. We'd like you to only consider the new **<%LT_MEAS_1>** that was installed

Was the new **<%LT_MEAS_1>** that was installed always on, 24 hours a day, 7 days a week?

1	Yes	SAME_AA1_AA2
2	No	DAYS_1
88	Refused	DAYS_1

DAYS_1 For the new **<%LT_MEAS_1>** that was installed were the lights not used at all during any of the 7 days of the week? If so, which days were the lights always OFF?

1	Monday	MONDAY_OPEN_1
2	Tuesday	MONDAY_OPEN_1
3	Wednesday	MONDAY_OPEN_1
4	Thursday	MONDAY_OPEN_1
5	Friday	MONDAY_OPEN_1
6	Saturday	MONDAY_OPEN_1
7	Sunday	MONDAY_OPEN_1
66	Open EVERYDAY	MONDAY_OPEN_1
88	REFUSED	MONDAY_OPEN_1
99	DON'T KNOW	MONDAY_OPEN_1

Ask if ALWAYS_AA1(2 or 88)&^DAYS_1(1); else skip to TUESDAY_OPEN_1;

MONDAY_OPEN_1 For this first unique lighting schedule, what time were the lights turned on on MONDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	MONDAY_CLOSE_1
88	REFUSED	MONDAY_CLOSE_1
99	DON'T KNOW	MONDAY_CLOSE_1

IF MONDAY_OPEN_1(1||64)

MONDAY_CLOSE_1 And what time were the lights turned off on MONDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	TUESDAY_OPEN_1
88	REFUSED	TUESDAY_OPEN_1
99	DON'T KNOW	TUESDAY_OPEN_1

Ask if ALWAYS_AA1(2 or 88)&^DAYS_1(2); else skip to WEDNESDAY_OPEN_1;

TUESDAY_OPEN_1 What time were the lights turned on on TUESDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	TUESDAY_CLOSE_1

88	REFUSED	TUESDAY_CLOSE_1
99	DON'T KNOW	TUESDAY_CLOSE_1

IF TUESDAY_OPEN_1(1||65)

TUESDAY_CLOSE_1 And what time were the lights turned off on TUESDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	WEDNESDAY_OPEN_1
88	REFUSED	WEDNESDAY_OPEN_1
99	DON'T KNOW	WEDNESDAY_OPEN_1

Ask if ALWAYS_AA1(2 or 88)&^DAYS_1(3); else skip to THURSDAY_OPEN_1;

WEDNESDAY_OPEN_1 What time were the lights turned on on WEDNESDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	WEDNESDAY_CLOSE_1
88	REFUSED	WEDNESDAY_CLOSE_1
99	DON'T KNOW	WEDNESDAY_CLOSE_1

IF WEDNESDAY_OPEN_1(1||65)

WEDNESDAY_CLOSE_1 And what time were the lights turned off on WEDNESDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	THURSDAY_OPEN_1
88	REFUSED	THURSDAY_OPEN_1
99	DON'T KNOW	THURSDAY_OPEN_1

Ask if ALWAYS_AA1(2 or 88)&^DAYS_1(4); else skip to FRIDAY_OPEN_1;

THURSDAY_OPEN_1 What time were the lights turned on on THURSDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	THURSDAY_CLOSE_1
88	REFUSED	THURSDAY_CLOSE_1
99	DON'T KNOW	THURSDAY_CLOSE_1

IF THURSDAY_OPEN_1(1||65)

THURSDAY_CLOSE_1 And what time were the lights turned off on THURSDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	FRIDAY_OPEN_1
88	REFUSED	FRIDAY_OPEN_1
99	DON'T KNOW	FRIDAY_OPEN_1

Ask if ALWAYS_AA1(2 or 88)&^DAYS_1(5); else skip to SATURDAY_OPEN_1;

FRIDAY_OPEN_1 What time were the lights turned on on FRIDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	FRIDAY_CLOSE_1
88	REFUSED	FRIDAY_CLOSE_1
99	DON'T KNOW	FRIDAY_CLOSE_1

IF FRIDAY_OPEN_1(1||65)

FRIDAY_CLOSE_1 And what time were the lights turned off on FRIDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	SATURDAY_OPEN_1
88	REFUSED	SATURDAY_OPEN_1
99	DON'T KNOW	SATURDAY_OPEN_1

Ask if ALWAYS_AA1(2 or 88)&^DAYS_1(6); else skip to SUNDAY_OPEN_1;

SATURDAY_OPEN_1 What time were the lights turned on on SATURDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	SATURDAY_CLOSE_1
88	REFUSED	SATURDAY_CLOSE_1
99	DON'T KNOW	SATURDAY_CLOSE_1

IF SATURDAY_OPEN_1(1||65)

SATURDAY_CLOSE_1 And what time were the lights turned off on SATURDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	SUNDAY_OPEN_1
88	REFUSED	SUNDAY_OPEN_1
99	DON'T KNOW	SUNDAY_OPEN_1

Ask if ALWAYS_AA1(2 or 88)&^DAYS_1(7); else skip to LIGHTING_SCHEDULES_1_1;

SUNDAY_OPEN_1 What time were the lights turned on on SUNDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	SUNDAY_CLOSE_1
88	REFUSED	SUNDAY_CLOSE_1
99	DON'T KNOW	SUNDAY_CLOSE_1

IF SUNDAY_OPEN_1(1||65)

SUNDAY_CLOSE_1 And what time were the lights turned off on SUNDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	LGT_AA1_4
88	REFUSED	LGT_AA1_4
99	DON'T KNOW	LGT_AA1_4

LGT_AA1 _4

Now, I'd like you to consider this unique lighting schedule we've been discussing for the new **<%LT_MEAS_1>** that was installed. And think of the period of time when the lights are typically on, versus typically off.

Even though the lighting is typically on, 100% of the lights may not be on that full time. And conversely, even though the lighting may typically be off, some lights may still be left on.

For the period when lighting is typically on, what percentage of this new lighting, on average, would actually be turned on?

	ENTER PERCENTAGE_____	LGT_AA1_5
888	REFUSED	LGT_AA1_5
999	DON'T KNOW	LGT_AA1_5

LGT_AA1_5 And conversely, what percent of these new **<%LT_MEAS_1>** might actually be turned on, on average, during the time period when the lighting was typically off.

1	ENTER PERCENTAGE_____	SAME_AA1_AA2
88	REFUSED	SAME_AA1_AA2
99	DON'T KNOW	SAME_AA1_AA2

ASK IF LGT_AA2_1 = (2, 88 or 99); ELSE SKIP TO CC2a

SAME_AA1_AA2 Now we'd like to talk about just one more lighting schedule. For this lighting schedule, we would like you to consider the new **<%LT_MEAS_2>** that was installed

Does this new **<%LT_MEAS_2>** operate according to the same schedule as the new **<%LT_MEAS_1>** that was installed ?

1	Yes	CC2a
2	No	ALWAYS _AA2
88	Refused	ALWAYS _AA2

ALWAYS_AA2 Was the new **<%LT_MEAS_2>** always on, 24 hours a day, 7 days a week?

1	Yes	CC2a
2	No	DAYS_2
88	Refused	DAYS_2

DAYS_2 For the new **<%LT_MEAS_2>**, were the lights not used at all during any of the 7 days of the week? If so, which days were the lights always OFF?

1	Monday	MONDAY_OPEN_2
2	Tuesday	MONDAY_OPEN_2
3	Wednesday	MONDAY_OPEN_2
4	Thursday	MONDAY_OPEN_2

5	Friday	MONDAY_OPEN_2
6	Saturday	MONDAY_OPEN_2
7	Sunday	MONDAY_OPEN_2
66	Open EVERYDAY	MONDAY_OPEN_2
88	REFUSED	MONDAY_OPEN_2
99	DON'T KNOW	MONDAY_OPEN_2

Ask if ALWAYS_AA2(2 or 88)&^DAYS_2(1); else skip to TUESDAY_OPEN_2;

MONDAY_OPEN_2 For this second unique lighting schedule, what time were the lights turned on on MONDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	MONDAY_CLOSE_2
88	REFUSED	MONDAY_CLOSE_2
99	DON'T KNOW	MONDAY_CLOSE_2

IF MONDAY_OPEN_2(1||64)

MONDAY_CLOSE_2 And what time were the lights turned off on MONDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	TUESDAY_OPEN_2
88	REFUSED	TUESDAY_OPEN_2
99	DON'T KNOW	TUESDAY_OPEN_2

Ask if ALWAYS_AA2(2 or 88)&^DAYS_2(2); else skip to WEDNESDAY_OPEN_2;

TUESDAY_OPEN_2 What time were the lights turned on on TUESDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	TUESDAY_CLOSE_2
88	REFUSED	TUESDAY_CLOSE_2
99	DON'T KNOW	TUESDAY_CLOSE_2

IF TUESDAY_OPEN_2(1||65)

TUESDAY_CLOSE_2 And what time were the lights turned off on TUESDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	WEDNESDAY_OPEN_2
88	REFUSED	WEDNESDAY_OPEN_2
99	DON'T KNOW	WEDNESDAY_OPEN_2

Ask if ALWAYS_AA2(2 or 88)&^DAYS_2(3); else skip to THURSDAY_OPEN_2;

WEDNESDAY_OPEN_2 What time were the lights turned on on WEDNESDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	WEDNESDAY_CLOSE_2
88	REFUSED	WEDNESDAY_CLOSE_2
99	DON'T KNOW	WEDNESDAY_CLOSE_2

IF WEDNESDAY_OPEN_2(1||65)

WEDNESDAY_CLOSE_2 And what time were the lights turned off on WEDNESDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	THURSDAY_OPEN_2
88	REFUSED	THURSDAY_OPEN_2
99	DON'T KNOW	THURSDAY_OPEN_2

Ask if ALWAYS_AA2(2 or 88)&^DAYS_2(4); else skip to FRIDAY_OPEN_2;

THURSDAY_OPEN_2 What time were the lights turned on on THURSDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	THURSDAY_CLOSE_2
88	REFUSED	THURSDAY_CLOSE_2
99	DON'T KNOW	THURSDAY_CLOSE_2

IF THURSDAY_OPEN_2(1||65)

THURSDAY_CLOSE_2 And what time were the lights turned off on THURSDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	FRIDAY_OPEN_2

88	REFUSED	FRIDAY_OPEN_2
99	DON'T KNOW	FRIDAY_OPEN_2

Ask if ALWAYS_AA2(2 or 88)&^DAYS_2(5); else skip to SATURDAY_OPEN_2;

FRIDAY_OPEN_2 What time were the lights turned on on FRIDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	FRIDAY_CLOSE_2
88	REFUSED	FRIDAY_CLOSE_2
99	DON'T KNOW	FRIDAY_CLOSE_2

IF FRIDAY_OPEN_2(1||65)

FRIDAY_CLOSE_2 And what time were the lights turned off on FRIDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	SATURDAY_OPEN_2
88	REFUSED	SATURDAY_OPEN_2
99	DON'T KNOW	SATURDAY_OPEN_2

Ask if ALWAYS_AA2(2 or 88)&^DAYS_2(6); else skip to SUNDAY_OPEN_2;

SATURDAY_OPEN_2 What time were the lights turned on on SATURDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	SATURDAY_CLOSE_2
88	REFUSED	SATURDAY_CLOSE_2
99	DON'T KNOW	SATURDAY_CLOSE_2

IF SATURDAY_OPEN_2(1||65)

SATURDAY_CLOSE_2 And what time were the lights turned off on SATURDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	SUNDAY_OPEN_2
88	REFUSED	SUNDAY_OPEN_2
99	DON'T KNOW	SUNDAY_OPEN_2

Ask if ALWAYS_AA2(2 or 88)&^DAYS_2(7); else skip to LIGHTING_SCHEDULES_1_2;

SUNDAY_OPEN_2 What time were the lights turned on SUNDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	SUNDAY_CLOSE_2
88	REFUSED	SUNDAY_CLOSE_2
99	DON'T KNOW	SUNDAY_CLOSE_2

IF SUNDAY_OPEN_2(1||65)

SUNDAY_CLOSE_2 And what time were the lights turned off on SUNDAY?

	Record Time 1AM - 12:30 AM in 12-hour format by half hour as 1-24	LGT_AA2_4
88	REFUSED	LGT_AA2_4
99	DON'T KNOW	LGT_AA2_4

LGT_AA2 _4

Now, I'd like you to consider this unique lighting schedule we've been discussing for the new **<%LT_MEAS_2>** And think of the period of time when the lights are typically on, versus typically off.

Even though the lighting is typically on, 100% of the lights may not be on that full time. And conversely, even though the lighting may typically be off, some lights may still be left on.

For the period when lighting is typically on, what percentage of this new lighting, on average, would actually be turned on?

1	ENTER PERCENTAGE_____	LGT_AA2_5
88	REFUSED	LGT_AA2_5
99	DON'T KNOW	LGT_AA2_5

LGT_AA2_5

And conversely, what percent of these new **<%LT_MEAS_2>** might actually be turned on, on average, during the time period when the lighting was typically off.

1	ENTER PERCENTAGE_____	CC2a
88	REFUSED	CC2a

99	DON'T KNOW	CC2a

CUSTOMER CHARACTERISTICS

We're almost finished. Now, I'd like to ask you questions regarding your facility.

What is the total square footage at this facility?

CC2a

77	RECORD Square feet	CC2c
88	Refused	CC3
99	Don't know	CC3

IF CC2a IN (88, 99)

CC3 Would you say that the floor area is ...?

1	less than 1,500 sq. ft.	CC2c
2	1,500 - 5,000 sq. ft.	CC2c
3	5,000 - 10,000 sq. ft.	CC2c
4	10,000 – 25,000 sq. ft.	CC2c
5	25,000 – 50,000 sq. ft.	CC2c
6	50,000 – 75,000 sq. ft.	CC2c
7	75,000 – 100,000 sq. ft.	CC2c
8	over 100,000 sq. ft. (ag area)	CC2c
88	Refused	CC2c
99	Don't know	CC2c

CC2c Is the entire floor area of this facility heated or cooled?

1	Yes	CC3a
2	No	CC2d
88	Refused	C0
99	Don't know	C0

CC2d What percentage of the floor area is heated or cooled?

77	Percent	CC3a
88	Refused	C0
99	Don't know	C0

If CC2d > 0 or CC2c = 1; else skip to C0

CC3a Is your space heated using electricity or gas or something else?

1	Electricity	C0
2	Gas	C0
3	Both electricity and gas	C0
4	Propane	C0
77	OPEN\Other-record	C0
88	Refused	C0
99	Don't know	C0

C0 About what percentage of your operating costs does energy account for?

1	Less than 1 percent	CC4
2	1-2 percent	CC4
3	3-5 percent	CC4
4	6-10 percent	CC4
5	11-15 percent	CC4
6	16-20 percent	CC4
7	21-50 percent	CC4
8	Over 51 percent	CC4
88	Refused	CC4
99	Don't Know	CC4

CC4 Does your organization own, lease, or manage the facility?

1	Own	C5
2	Lease/Rent	C5
3	Manage	C5
88	Refused	C5
99	Don't know	C5

C5 How many locations does your organization have. Is it....

1	This facility only	CC6
2	2 to 4 locations	CC6
3	5 to 10 locations	CC6
4	11 to 25 locations	CC6
5	more than 25 locations	CC6
88	Don't know	CC6
99	Refused	CC6

CC6 How active a role does your organization take in making purchase decisions related to energy using equipment at this facility? Would you say you are...

1	Very active – involved in all phases and have veto power	CC7
2	Somewhat active – we approve decisions and provide some input and review	CC7
3	Slightly active – we have a voice but it's not the dominant voice	CC7
4	Not active at all – we're part of a larger firm	CC7
5	Not active at all – our firm doesn't get involved in these issues	CC7
88	Refused	CC7
99	Don't know	CC7

CC7 Does your firm have a maintenance company that you use to maintain any of your building systems such as lighting, HVAC, refrigeration, or food service equipment?

1	Yes	CC11a
2	No	CC11a

88	Refused	CC11a
99	Don't Know	CC11a

CC11a In what year was your facility built, approximately?

7777	Year	CC12a
8888	Refused	CC11b
9999	Don't know	CC11b

If CC11a in (88, 99) then ask; else skip to CC12a

CC11b Would you say it was…

1	After 2010	CC12a
2	Between 2006 and 2010	CC12a
3	Between 2000 and 2005	CC12a
4	In the 1990s	CC12a
5	In the 1980s	CC12a
6	In the 1970s	CC12a
7	In the 1960s or	CC12a
8	Before 1960	CC12a
88	Don't know	CC12a
99	Refused	CC12a

CC12a In what year was this organization established at this location?

7777	Year	BC090
8888	Refused	CC12b
9999	Don't know	CC12b

If CC12a in (88, 99) then ask; else skip to BC090

CC12b Would you say it was…

1	After 2010	BC090

2	Between 2006 and 2010	BC090
3	Between 2000 and 2005	BC090
4	In the 1990s	BC090
5	In the 1980s	BC090
6	In the 1970s	BC090
7	In the 1960s or	BC090
8	Before 1960	BC090
88	Don't know	BC090
99	Refused	BC090

ADDITIONAL FACILITY CHARACTERISTICS

BC090 Has the square footage of the facility increased, decreased or remained the same since January 2018?

1	Increase in square footage	BC100
2	Decrease in square footage	BC110
3	Stayed the same	Vendor_Name
88	Refused	Vendor_Name
99	Don't know	Vendor_Name

If BC090 = 1 then ask; else skip to BC110

BC100 How many square feet were added?

77	Square feet	BC120
88	Refused	BC120
99	Don't know	BC120

If BC090 = 2 then ask; else skip to BC120

BC110 By how many square feet was the facility reduced?

77	Square feet	BC120
88	Refused	BC120

99	Don't know	BC120

If BC090 in (1, 2) then ask; else skip to CA15

BC120 In what year did this <%BC090> occur?

1	2019	OtherChanges
2	2020	OtherChanges
3	2021	OtherChanges
88	Refused	OtherChanges
99	Don't know	OtherChanges

OtherChanges Did you make any other equipment changes to your facility, since 2019? Probe for any other changes to lighting, HVAC, refrigeration installs, etc.

77	YES - RECORD VERBATIM	OtherChg_Date
02	No	Vendor_Name
99	Don't know	Vendor_Name

OtherChg_Date Approximately when did these changes occur

77	RECORD VERBATIM	Vendor_Name
99	Don't know	Vendor_Name

Ask if V1(1)

Vendor_Name Earlier you stated that you had a vendor/contractor that helped you with the installation of the lighting equipment that was installed through the <%UTILITY> Program. Could you provide me with their name and phone number?

1	Cannot provide	END
77	Record Name, Phone Number, Email Address or any other information they can provide. More is better.	END
88	Refused	END

99	Don't know	END

END	Those are all the questions I have for you today. On behalf of the CPUC, I would like to thank you very much for your kind cooperation. Have a good day.	

Appendix D. Ex Ante Review of SFDI and Multifamily Program Savings

This section presents background information related to findings about the accuracy of MCE's SFDI and Multifamily claims and issues uncovered from a thorough examination of associated MCE, eTRM, and CEDARS data. For clarity, the examination includes definitions for key data fields used throughout this Appendix and which appear in Table 28 below. For additional detailed data definitions, please reference the CEDARS claims data specification or the eTRM User Guide.

Table 28. Key Data Field Definitions

Table Name	Data Field Name	Data Field Description
Claim	BldgHVAC	Standard ExAnte Building HVAC Type
Claim	BldgLoc	Standard ExAnte Building Location/Climate Zone
Claim	BldgType	From Database for Energy-Efficient Resources (DEER). Text codes which identify the building type/use and other parameters specific to that building use. For example, "Com" = Commercial buildings.
Claim	BldgVint	Standard ExAnte Building Vintage
Claim	ClaimID	Unique and persistent identifier of each claim record; please include the Upload PA code and Claim Year at the beginning of the ClaimID (ex. PGE-2020-152645)
Claim	DeliveryType	From DEER. Identifies program implementation strategy/method of delivering a measure to a customer (e.g., direct install).
Claim	EUC_Flag	Flag to identify Energy Upgrade California claims
Claim	MeasAppType	From DEER. The measure application identifies the context for the measure's installation (e.g., accelerated replacement, new construction or behavioral).
Claim	MeasImpactType	From DEER. Describes how the savings impact was determined (e.g., Deemed-DEER, Deemed-Workpaper, Site-specific calculation, etc.).
Claim	NormUnit	Type of normalizing units, or basis of NumUnits or quantity used by the cost effectiveness calculation (e.g., 'lamp', 'hp', 'tons', 'facility', etc.)
Claim	NTG_ID	From DEER. The Ex Ante NTG_ID associated with the NTG values being claimed.
Claim	NumUnits	Number of units or quantity. NumUnits must work in conjunction with the NormUnit value for the claim. Cross reference NormUnit and NumUnits before interpreting quantities of measures installed.
Claim	PrgID	Links claim to Program table; Must exist in EEGA; (e.g., PGE21041)
Claim	TotalFirstYearGrosskW	Total first year gross kW savings to be claimed
Claim	TotalFirstYearGrosskWh	Total first year gross kWh savings to be claimed
Claim	TotalFirstYearGrossTherm	Total first year gross therm savings to be claimed
Measure	EUL_ID	Specifies a row in EUL table that specifies the estimated useful life of the measure technology
Measure	EUL_Yrs	Effective useful life of EE measured in years
Measure	GSIA_ID	References the Ex Ante Gross Savings and Installation Adjustment table
Measure	MeasAppType	Standard Ex Ante Measure application type (e.g., ROB)
Measure	MeasImpactType	Measure Impact Type

Table Name	Data Field Name	Data Field Description
Measure	MeasureID	Unique and persistent measure identifier
Measure	NormUnit	Type of normalizing units, or basis of NumUnits or quantity used by the cost effectiveness calculation (e.g., 'lamp')
Measure	NTG_ID	Claimed Ex Ante NTG_ID, if different than the default NTG_ID associated with the implementation being claimed
Measure	NumUnits	Number of units or quantity associated with this claim (e.g., 206)
Measure	RUL_ID	Specifies a row in Ex Ante EUL table that identifies the remaining useful life of the existing technology
Measure	RUL_Yrs	Remaining useful life of pre-existing equipment measured in years
Measure	Sector	Standard Ex Ante sector (e.g., Ind)
Measure	SourceDesc	Description of the specific source for the data; The workpaper or DEER ID including revision (e.g., PGE3PHVC149r0)
Measure	UnitkW1stBaseline	The first baseline kW savings per Unit
Measure	UnitkW2ndBaseline	The second baseline kW savings per Unit
Measure	UnitkWh1stBaseline	The first baseline kWh savings per Unit
Measure	UnitkWh2ndBaseline	The second baseline kWh savings per Unit
Measure	UnitTherm1stBaseline	The first baseline therm savings per Unit
Measure	UnitTherm2ndBaseline	The second baseline therm savings per Unit

Source: CEDARS Metadata

Accuracy of Claims Data

The purpose of this subtask was to 1) verify if there were any large data errors found in the detailed claims data, and 2) examine how the claimed savings values (ex ante savings) compare to approved ex ante values (eTRM data) by reviewing items such as:

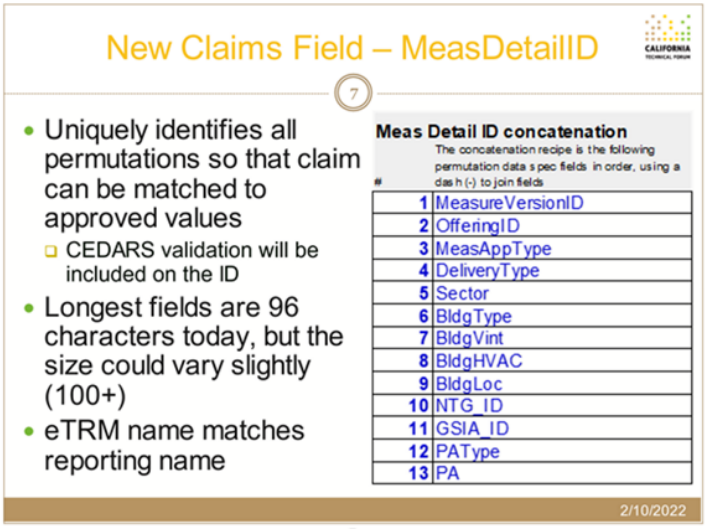
- unit energy savings (UES) by building type, HVAC, vintage, and/or climate zone;
- net-to-gross (NTG);
- effective useful life (EUL)/remaining useful life (RUL); and,
- measure application type (accelerated vs. normal replacement, commonly abbreviated as AR vs. NR).

Methods for Matching CEDARS Claims to eTRM

The evaluation team took the following steps to match the 2021 MCE claim data with corresponding measures in the eTRM to check the accuracy of the claims data.

We first downloaded the most recent 2021 Annual MCE claim record-level data from CEDARS, along with the most recent measure permutation data from the eTRM. Since these are large datasets, each was filtered appropriately such that the evaluation team was only handling MCE deemed, residential data based on CPUC-approved measure packages. After filtering the claim and eTRM data, the team implemented a primary key in the claim data, the details of which were provided by the eTRM team. Figure 5 shows the eTRM primary key which is intended to align directly with new claims.

Figure 5. eTRM MeasDetailID



The intent of the primary key was to combine a series of claim fields into a single field which, in theory, should match the 'MeasDetailID' field in the eTRM. Unfortunately, that match was unsuccessful using the key we were provided; however, starting in 2022, MeasDetailID was added to the claim data, which should make the alignment to the eTRM much more straightforward.

Since there was not an easy match using the provided key, the evaluation team applied its deep knowledge of the claim data to systematically adjust the key, based on differences they inferred from the data and iteratively matched with the eTRM MeasDetailID, adding matches with each iteration. Mismatches were largely a result of either 1) combinations of parameters that were claimed but were not available in the eTRM or 2) MCE was claiming invalid combinations of parameters that are intentionally excluded from the eTRM so they cannot be offered. After 11 iterations of adjusting the key and matching, the team successfully matched all claims included in this analysis, allowing for the direct comparison of the claim and eTRM. The bullets below represent the iterations required to successfully match the claim with the eTRM.

- Match 1: Modify MeasDetailID to Modify CZ to handle CZ '3A' and '3B', Remove OfferingID
- Match 2: Modify BldgVint to handle 'Any'
- Match 3: Modify BldgHVAC to handle 'Any'
- Match 4: Combine Matches 2+3
- Match 5: Handle MeasAppType and DeliveryType mismatches
- Match 6: Handle HVAC mismatches 'rWtd'
- Match 7: Handle MeasAppType mismatches, DeliveryType differences 'DnDeemed' vs 'DnDeemedDI', and HVAC mismatches
- Match 8: Handle BldgType and CZ mismatches, and handle HVAC = 'cUnc'
- Match 9: Handle BldgVint = 'Old' vs 'Ex'
- Match 10: Handle BldgVint = 'Old' and HVAC = 'rWtd'
- Match 11: Handle BldgVint = 'Ex' and HVAC = 'Any'

Rules for Fuel Substitution Single-Fuel Conversion

The Cost Effectiveness Tool (CET)/CEDARS implements Energy Division's policy on fuel substitution. This occurs in claims, filings, and in the CET User Interface (CET_UI) runs, as explained in detail at the link below and briefly here. Please note that the fuel substitution post-processing outlined below is completed after the claim is submitted. For purposes of this analysis, eTRM values were compared to the claim values prior to the fuel substitution post-processing occurring so that we have an apples-to-apples comparison.

https://cedars.sound-data.com/cet_ui/cet-user-guide/

- The CET_UI identifies fuel substitution measures using the MeasImpactType field. Values from the MeasImpactType value list ending with 'FuelSub' specify a fuel sub measure.
- As specified in the "validation_rules.csv" file, fuel substitution measures require one or both of UnitkWh1stBaseline or UnitTherm1stBaseline to have positive values.
- The CET_UI only performs fuel sub special handling on energy savings (kWh and therm). No special handling is performed on other output parameters (i.e., Budget, Cost Effectiveness).
- Savings associated with fuel sub measures are converted to single fuel if:
  - Therm savings are positive, then all savings convert to kWh and therms are zeroed out.
  - kWh savings are positive and therm savings are negative, then all savings are converted to therms and kWh are zeroed out.
- The following conversion factors were used:
  - 1 therm = 29.3 kWh
  - 1 kWh = 0.03413 therms

Comparison Results

After matching the MCE 2021 annual claim data with the eTRM, a series of checks were carried out, including:

- a review that all flags were denoted correctly;
- the timing of entering data in CEDARS was appropriate (e.g., that the dates of claims reflect when projects took place); and,
- a basic review and QC of all data fields.

Data checks were based on the team's experience identifying errors in the claims data, including the following:

- Missing values
  - CEDARS performs this QC check for fields where NULL is not an option, but not all items are caught for fields where, based on the value of another field, a NULL may not be allowed
- Parameter-level savings in the incorrect column
  - Ex: Therms savings in the kW field and vice versa
- Correct order of magnitude and sign
  - Ex: kW field has savings in Watts
- Flags

- Often one or more of the flags are incorrect. This may include the Res flag being "1" and the BldgType being "Office", or the custom flag being "1" when there is a deemed workpaper description.

- Installation dates
- EUL/RUL incorrect for measure application type
- Number of units claimed not consistent with unit type
- Installation rates and/or realization rates are correct and match eTRM requirements

Data was also filtered in various ways to look for outliers. As noted below, we found only a few issues/errors in the claims data.

Claims Versus eTRM Data

As noted in the report, the evaluation team focused on the deemed portions of the SFDI and Multifamily programs. Due to several fuel substitution measures rebated under the SFDI program as well as significant gas-saving equipment claims, there are relatively low kWh savings for this program. There are also low kWh savings for the Multifamily program, even though no fuel substitution measures were rebated. The last rows of Table 2, below, present the positive and negative kWh savings, kW, and therms for the SFDI and Multifamily programs combined. The total first year gross savings is equal to just under 5.6 MWh (-42.7 MWh + 48.3 MWh), which is a fraction of the contribution to MCE's 2021 portfolio savings relative to those from the Commercial Upgrade program (evaluated first year gross savings of 1,619 MWh).

In the analysis, the team compared the pre-Cost Effectiveness Tool (pre-CET) output values allowing a direct comparison of claimed parameters against those provided in the eTRM. Since both the claimed values and the eTRM values are pre-CET and pre-CEDARS fuel substitution single-fuel post-processing, and the goal is to show the impact of aligning each claim record with an eTRM measure permutation record, the analysis was limited to pre-CET-output values, as well.

Table 2. MCE 2021 Total Annual Claimed vs. eTRM-Mapped, First Year Gross Energy Savings for Deemed Measures

Program	Energy Savings Unit	Quarterly Claims Data 2021 Annual	eTRM Mapped/Corrected Quarterly Claims Data 2021 Annual	Difference
SFDI	kWh (negative, fuel sub)	-44,364	-42,772	4%
	kWh (positive)	35,114	33,309	5%
	kW	43	31	28%
	therms	28,074	28,142	0%
Multifamily	kWh (negative, fuel sub)	0	0	0%
	kWh (positive)	6,815	15,061	121%
	kW	1	9	943%
	therms	423	644	52%
Total	kWh (negative, fuel sub)	-44,364	-42,772	4%
	kWh (positive)	41,929	48,369	15%
	kW	43.5	39.6	9%
	therms	28,497	28,786	1%

Contributing Factors to Savings Differences

After we mapped each Claim record to a corresponding eTRM permutation record, we inspected measures with the largest magnitude differences. We discuss those differences below.

Unit Energy Savings Comparisons

Unit Gross kWh

For gross kWh savings, we split the results into two rows in Table 23 above: one row represents negative kWh savings due solely to fuel substitution measures, and another row shows positive kWh savings. The negative gross kWh savings comparison shows that the claimed versus eTRM-mapped values are within 4% of one another, with only a few instances of unit kWh savings differences. Conversely, the positive gross kWh comparison illustrates a more significant difference between the claimed and eTRM-mapped totals. This difference can be largely attributed to a single claim record from the Multifamily program, ClaimID MCE-2021-8491. For this measure, the difference between the claim and the eTRM-mapped total gross kWh savings is 8,252 kWh, constituting nearly the entire difference in the positive gross kWh row shown in Table 232 above. This measure is a DHW pump demand control measure whose claimed per-unit kWh savings is 6.11 kWh as compared to the eTRM value of 124 kWh. Despite the large difference between per-unit kWh savings, the per-unit therm savings are reasonably close; claimed per-unit therm savings is 8.14 therms compared to the eTRM value of 11.3 therms. This small difference appears to indicate that the issue is not related to a difference in the unit basis, and it was confirmed that both the eTRM and claims use the same NormUnit (per-unit) basis of 'household'.[67]

Other measures with large differences between claimed and approved eTRM unit kWh values include Duct Seal and Test (70% difference) and Ceiling Insulation (53% difference), but these measures represent a small fraction of the savings for these two programs.

Unit Gross Therms

For unit gross therm savings, the only measure with a large difference between claimed and approved eTRM values was Faucet Aerators (57-59% difference). For many of the faucet aerator measures, MCE customized the unit savings due to the approved workpaper/measure package not including a normal replacement measure application type (MAT). MCE included comments stating that the eTRM did not have any approved normal replacement measure cases, so they selected the 'AR' Measure Application Type and claimed only the normal replacement savings portion as the 1st baseline as well as reducing the EUL for their calculations.

Parameter-Level Issues

Aside from the UES issues outlined above, there are some additional parameters with differences between the claimed and approved eTRM values, leading to various discrepancies with gross and net savings as well as other categorization issues:

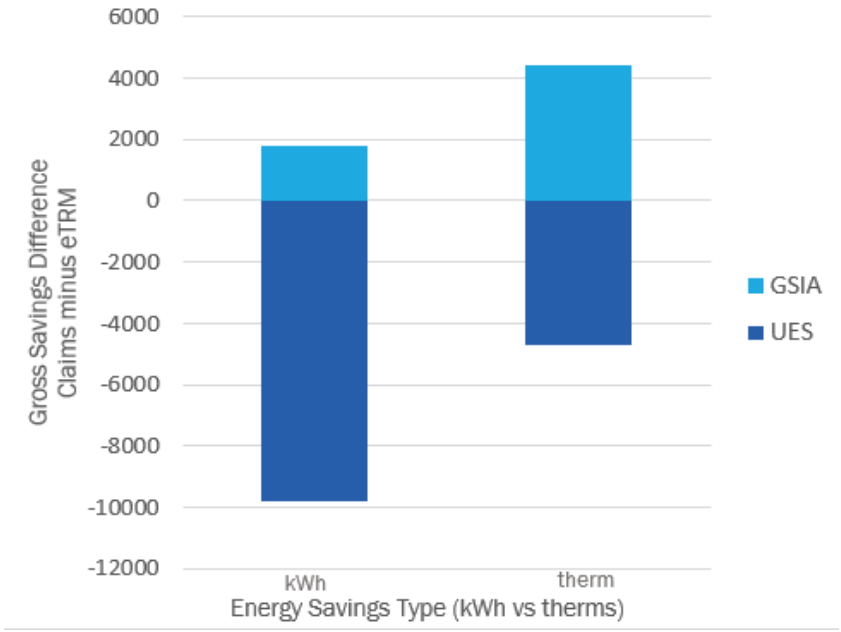
- Net to Gross (NTG): The claim included NTG_ID's referencing both the special Energy Upgrade California (EUC) and Hard to Reach (HTR) values, which are not available in the eTRM.
- Gross Savings and Installation Adjustment (GSIA): The Installation Rates are set equal to 1 for deemed duct sealing and testing, faucet aerators, and showerheads, even though eTRM sets GSIA values to 0.46, 0.66 and 0.74 for these, respectively.

[67] After presentation of this issue to MCE staff, MCE believe they were using an incorrect eTRM measure permutation which was leading to the difference.

- Measure Application Type (MAT): As noted above, for some measures, MCE claimed a 'normal replacement' MAT when the eTRM only has approved 'accelerated replacement' MAT. MCE frequently customized the calculation methodology to work around this discrepancy. This is a notable issue as the lack of a specific MAT type in the eTRM typically indicates the measure cannot be delivered that way.

Figure 6 below shows the relative contributions of parameters to differences between the MCE-claimed first-year gross savings as compared to the eTRM-mapped 2021 savings. All net savings discrepancies are caused by differences in the claimed NTG ratio. Note that UES differences are due to eTRM values being larger than claim values, thus a negative value is shown on the stacked bar chart (claim minus eTRM). The GSIA differences are due to the claim values being larger than eTRM values (claim value is always '1', eTRM value is frequently less than '1'). Gross kWh differences are more heavily influenced by the UES differences, whereas gross therm differences are nearly equally influenced by UES and GSIA.

Figure 6. Parameters Contributing to First Year Gross Savings Differences



Claims to eTRM Measure Permutation Matching Issues

Matching the MCE claim records with corresponding eTRM records was arduous. However, this exercise should be seamless beginning with 2022 claims, with the implementation of a new MeasDetailID field in the claim. It should be noted that, in the future, this field will provide a unique value for every measure permutation in the eTRM. In the current evaluation, the following parameter/field-level issues contributed to the difficulty experienced while aligning the claim to the eTRM:

- BldgHVAC
  - 'rWtd' or 'Any' or 'cUnc' in claim vs 'rDXGF', 'rWtd', etc. in eTRM, and vice versa. Frequently, eTRM only had one HVAC option: ex. 'rDXHP', while MCE claims 'rDXGF'.
  - In the example above, MCE was incorrect and should have used HP since this is a fuel substitution measure.

- There are likely cases where the eTRM should have had additional BldgHVAC options available; for example, there should be a dialog to discuss all options needed in the eTRM. This could also be related to how BldgHVAC is specified in the specific measure package.

- BldgVint
  - eTRM uses "Ex" and "Old".
  - Since there are several options for claiming BldgVint (‘Ex’, ‘New’, ‘Old’, ‘Rec’), there are likely cases where the eTRM should have had additional options available. At some point, there should be a dialog to discuss all options needed in the eTRM to avoid future issues. Issues could also be related to how BldgVint is specified in the specific measure package.
  - MCE data incorrectly uses 'Ex' where eTRM uses 'Old', and vice versa.
- BldgLoc
  - For climate zone 3, MCE correctly uses ‘3A’ and ‘3B’, per CET/CEDARS rules.
  - The eTRM only has ‘3’ as an option, which doesn’t align with the claim specification.
  - This is not an MCE mistake.
- DeliveryType
  - Frequent differences between claim and eTRM were noted: ‘DnDeemed’ vs ‘DnDeemedDI’.
  - For example, eTRM only offers ‘DnDeemed’ for a measure, but MCE claims ‘DnDeemedDI’.
  - Since there are several options for claiming DeliveryType, there are likely cases where the eTRM should have had additional options available; there should be a dialog to discuss all options needed in the eTRM. Issues could also be related to how DeliveryType is specified in the specific measure package.
  - Also, the eTRM has all measures where MeasAppType = ‘BRO-Bhv’ listed as DeliveryType = ‘DnCust’. This could be an eTRM issue, but there should be further discussion with the eTRM team.
- MeasAppType
  - Frequent differences between claim and eTRM measure application types, specifically, ‘Bro-OP’ vs ‘BRO-Bhv’.
  - Further research is needed to understand these discrepancies and their impacts.
- MeasureID
  - MCE frequently does not provide the correct letter (ex. ‘A’ - ‘J’) so that the MeasureID resolves to an eTRM MeasDetailID. Ex: MCE’s SWWH015-02 should have a letter which should match the 'OfferingID' from the eTRM but does not.
    - MCE should fix these discrepancies to match eTRM.
  - In the above example, MCE should include the letter 'A' - 'J' as part of the MeasureID. It was observed that sometimes MCE leaves this blank, so the program cannot effectively resolve to an eTRM MeasureID and MeasDetailID.
    - MCE should fix these blanks.

Detailed Conclusions and Next Steps

Aside from those issues listed above, the evaluation team has not found any other significant data gaps or errors. Based on comments in MCE's 2021 claim, it appears that some of eTRM data may need to be updated to reflect the latest approved eTRM workpaper/measure packages. It also appears that there is a need for additional measure permutations in the eTRM to cover real-world scenarios, such as the 'HTR' and 'EUC' NTG_IDs. Those issues aside, it does appear that MCE is likely claiming some incorrect parameter values such as UES and GSIA. This issue, along with some of the others listed, should be alleviated in the future by tighter integration between claims and eTRM. The following are some specific recommendations for future work that could help address some of the issues presented in this Appendix.

- The primary sources MCE uses for UES and GSIA are different from those eTRM uses, and MCE should continue to work with the Deemed Ex Ante and eTRM teams to:
  - Ensure that measure permutation data stored in the eTRM match the measure packages/workpapers narratives because MCE claim data frequently does not align with the permutation data stored in the eTRM.
  - Ensure that additional measure permutations are added to the eTRM to cover additional options for parameters such as NTG, where 'HTR' and ''EUC' are not offered in the eTRM but are needed by claims.
- Monitor 2022 MCE claims to verify the new MeasDetailID field alleviates some of the matching issues.
  - The MeasDetailID will likely solve some matching issues and help uncover some of the issues laid out in this Appendix.
  - For those issues which still exist, MCE should work with the eTRM team to ensure that the appropriate values exist in the eTRM.

Beyond the MeasDetailID addition, the CPUC announced plans to integrate the eTRM data more tightly with claims. Since the PAs would not actually be providing any of the parameters addressed by this Appendix (e.g., UES, NTG, GSIA) in the claim itself, tight integration could alleviate some of the issues laid out in this Appendix, although Energy Division should continue to verify the total savings being claimed.

Appendix E. SFDI Survey Instrument

Instrument Information

Table 29 includes key characteristics about the instrument.

Table 29. Overview of Data Collection Activity

Descriptor	This Instrument
Instrument Type	Phone survey
Estimated Time to Complete	15 minutes
Population Description	2021 Participants
Sampling Strata Definitions	Single family homeowners and/or tenants
Population Size	511
Contact List Size	500
Completion Goal(s)	Census
Contact List Source and Date	MCE program tracking data
Type of Sampling	Census
Contact Sought	Homeowner, MCE Customer Account Contact
Incentive Types and Amounts	None
Outreach Methods	Outbound Calling
Fielding Firm	Wilkins Research

Research Objectives Information

Table 30 maps the research objectives and questions to specific questions in the instrument.

Table 30. Research Objectives and Associated Questions

Research Objective/Question	Associated Instrument Questions
Collect data for net-to-gross analysis (free ridership and spillover data)	Not Applicable

Programmer Information

The variables listed in Table 31 are from the sample, database, or other external data source. The variables listed in

Table 32 are to be generated/calculated within the instrument.

Table 31. Variables from Sample or Database

Variable Name	Variable Description and Values
Respondent Contact Information	
Contact Name	Name of homeowner or household member knowledgeable about the program or energy efficient equipment installed
Contact Phone Number	Contact phone number
Address	Street address where energy efficient equipment was/were installed

Variable Name	Variable Description and Values
Equipment Flags and Associated Quantity Variables	
dseal_fl	Duct sealing flag (1 denotes participant received duct sealing, 0 denotes participant did not receive duct sealing)
in_fl	Insulation flag (1 denotes participant received insulation, 0 denotes participant did not receive insulation)
pwrap_fl	Pipe wrap (1 denotes participant received pipe wrap, 0 denotes participant did not receive pipe wrap)
fa_fl	Faucet aerator (1 denotes participant received faucet aerator, 0 denotes participant did not receive faucet aerator)
fa_qty	Number of faucet aerators received by participant
sh_fl	Low flow showerhead (1 denotes participant received low flow showerhead, 0 denotes participant did not receive low flow showerhead)
sh_qty	Number of low flow showerheads received by participant
furn_fl	Furnace (1 denotes participant received furnace, 0 denotes participant did not receive furnace)
furn_qty	Number of furnace(s) received by participant
hpump_fl	Heat pump (heating and cooling) (1 denotes participant received heat pump, 0 denotes participant did not receive heat pump)
stat_fl	Smart thermostat (1 denotes participant received smart thermostat, 0 denotes participant did not receive smart thermostat)
stat_qty	Number of smart thermostat(s) received by participant
wheat_fl	Water heating (1 denotes participant received a water heater, 0 denotes participant did not receive water heater)
wheat_qty	Number of water heater(s) received by participant

Table 32. Variables Generated in the Instrument

Variable Name	Variable Description and Values
v_dseal	Verified receipt of duct sealing (1 = received, 0 = did not receive)
v_in	Verified receipt of insulation (1 = received, 0 = did not receive)
v_pwrap	Verified receipt of pipe wrap (1 = received, 0 = did not receive)
v_fa	Verified receipt of faucet aerator(s) (1 = received, 0 = did not receive)
v_sh	Verified receipt of showerhead(s) (1 = received, 0 = did not receive)
v_furn	Verified receipt of furnace (1 = received, 0 = did not receive)
v_hpump	Verified receipt of heat pump (1 = received, 0 = did not receive)
v_stat	Verified receipt of smart thermostat (1 = received, 0 = did not receive)
v_wheat	Verified receipt of water heater (1 = received, 0 = did not receive)
NTGMEAS1	Denotes first equipment type to ask about in the Free Ridership section
NTGMEAS2	Denotes second equipment type to ask about in the Free Ridership section
NTGMEAS3	Denotes third equipment type to ask about in the Free Ridership section
Inconsistency 1	Read in for consistency checks based responses to a set of free ridership questions

Programming Note Style Conventions in This Document

[PROGRAMMING]	Programming instructions are in bracketed CAPS.
[*Interviewer notes*]	Onscreen interviewer instructions are in *italics*.
<Piped value>	Database inputs are inside <greater and less than symbols>.
(Response Option)	Instructions on whether the response option needs to be read out to the respondent. If response option – e.g., 1. (Yes) – is enclosed in parenthesis, only read out to the respondent if needed. For each multiple-response question, create separate binary variables for each response option.

Surveyor/Interviewer Information

Program Description

MCE's SFDI Program provides energy-saving kits, virtual home energy assessments, and home upgrades at no cost to eligible homeowners and tenants in single family dwellings within MCE's service area. It targets moderate-income customers whose household income exceeds 200% of the Federal Poverty Guidelines (FPG). The program also relies on a Single Point of Contact (SPOC) model and is used as a gateway program that encourages customers to identify additional energy efficiency opportunities in their homes. The program also provides customers with energy education resources to help them understand how installed measures can help reduce energy use in their homes. Energy efficient equipment offered by this program include:

- Building Envelope Measures
  - Duct sealing
  - Insulation (attic)
  - Pipe wrap
- Water Conservation Measures
  - Faucet aerator
  - Low flow showerhead
- HVAC
  - Furnace
  - Heat pump (heating and cooling)
  - Smart thermostat
- Domestic hot water heating
  - Efficient water heating equipment such as water heaters

Outreach

Pre-Call Email

The following email will be sent to all who have failed to respond after six telephone attempts and have an email address on file.

We have been trying to reach you by telephone to conduct an important survey to learn about your experiences with the free energy saving equipment your household received through MCE's Home Energy Savings Program.

This week, a representative with Wilkins Research will call to complete this brief interview. We are not selling anything; we'd just like to ask your opinion about this program. We assure you that your responses will be kept confidential; your individual responses will not be revealed to anyone.

We hope you will consider answering the phone and speaking with our interviewer. Thank you in advance for your time and participation. If you want to schedule a time for Wilkins Research to call you, please respond to this email with convenient times.

Email will be sent from the Taylor.Williams@opiniondynamics.com email address.

Instrument

Introduction/Call Script

Hello, my name is <interviewer name>, and I'm calling on behalf of the California Public Utilities Commission to ask you some questions about your participation in MCE's Home Energy Savings Program [*Note to Interviewer: If needed, please read, "also known as the Single Family Direct Install Program"*]. May I speak with [contact name]?

[*Note to Interviewer: If contact unavailable, please ask for an adult who makes decisions on how household uses energy or energy using equipment.*]

I'm with Wilkins Research that works with the California Public Utilities Commission. I am calling to learn about your experiences with the free energy saving equipment your household received through MCE's Home Energy Savings Program. I'm not selling anything; I'd just like to ask your opinion about this program. I'd like to assure you that your responses will be kept confidential, and your individual responses will not be revealed to anyone.

[*If needed, Interviewer, please read: This survey should take about 15 minutes of your time, depending on your responses.*]

Is this a good time for us to speak with you? [*IF NOT, SET UP CALL BACK APPOINTMENT.*]

[*Additional information if needed:*

- *Who is doing this study: The California Public Utilities Commission, which regulates the utilities and certain other electricity providers, is overseeing evaluations of most of California's energy efficiency programs.*
- *Why are you conducting this study: Studies like this help the State of California and MCE better understand customers' need for and interest in energy programs and services.*]

Screening [ASK ALL]

MCE's Home Energy Savings program records indicate that your household received the following energy saving equipment [1 = Yes, 2 = No, 98 = Don't know]. For each equipment I mention, please confirm via "yes" or "no" if you've received the equipment,

Equipment	1. (Yes), household received equipment	2. (No), household did not receive equipment	98. Do not know if house hold received equipment
a. [Show if dseal_fl = 1] Duct sealing	☐	☐	☐
b. [Show if in_fl = 1] Insulation	☐	☐	☐
c. [Show if pwrap_fl = 1] Pipe wrap	☐	☐	☐
d. [Show if fa_fl = 1] <fa_qty> Low flow faucet aerator(s)	☐	☐	☐
e. [Show if sh_fl = 1] <sh_qty> Low flow showerhead(s)	☐	☐	☐
f. [Show if furn_fl = 1] <furn_qty> Furnace	☐	☐	☐
g. [Show if hpump_fl = 1] <hpump_qty> Heat pump	☐	☐	☐
h. [Show if stat_fl = 1] <stat_qty> Smart thermostat(s)	☐	☐	☐
i. [Show if wheat_fl = 1] <wheat_qty> High Efficiency water heater	☐	☐	☐

[*IF ALL S1a to S1i = 2 OR 98, Thank and Terminate. Terminate script: "Those are all the questions I have for you today. Thank you for your willingness to participate in this study."*]

[GENERATE
v_dseal = 1 if S1a = 1, else 0,
v_in = 1 if S1b = 1, else 0,
v_pwrap = 1 if S1c = 1, else 0,
v_fa = 1 if S1d = 1, else 0,
v_sh = 1 if S1e = 1, else 0,
v_furn = 1 if S1f = 1, else 0,
v_hpump = 1 if S1g = 1, else 0,
v_stat = 1 if S1h = 1, else 0,
v_wheat = 1 if S1i = 1, else 0]

Installation Verification

IV1. Now, I would like to understand what you did with the energy saving equipment you received through MCE's Home Energy Savings program. Was/Were the following energy saving equipment from the program installed?

Equipment	1. (Yes)	2. (No)	98. Do not know
a. [Show if v_dseal = 1] Duct sealing	☐	☐	☐
b. [Show if v_in = 1] Insulation	☐	☐	☐
c. [Show if v_pwrap = 1] Pipe wrap	☐	☐	☐
d. [Show if v_fa = 1] Low flow faucet aerator(s)	☐	☐	☐
e. [Show if v_sh = 1] Low flow showerhead(s)	☐	☐	☐

Equipment	1. (Yes)	2. (No)	98. Do not know
f. [Show if v_furn = 1] Efficient furnace	☐	☐	☐
g. [Show if v_hpump = 1] Heat pump	☐	☐	☐
h. [Show if v_stat = 1] Smart thermostat(s)	☐	☐	☐
i. [Show if v_wheat = 1] High efficiency water heater	☐	☐	☐

IV2. Is/Are the following energy saving equipment that was/were installed through the program still installed?

Equipment	1. (Yes)	2. (No)	98. Do not know
a. [Show if IV1a = 1] Duct sealing	☐	☐	☐
b. [Show if IV1b = 1] Insulation	☐	☐	☐
c. [Show if IV1c = 1] Pipe wrap	☐	☐	☐
d. [Show if IV1d = 1] Low flow faucet aerator(s)	☐	☐	☐
e. [Show if IV1e = 1] Low flow showerhead(s)	☐	☐	☐
f. [Show if IV1f = 1] Efficient furnace	☐	☐	☐
g. [Show if IV1g = 1] Heat pump	☐	☐	☐
h. [Show if IV1h = 1] Smart thermostat(s)	☐	☐	☐
i. [Show if IV1i = 1] High efficiency water heater	☐	☐	☐

NTGMEAS Assignment

[SET TOP 3 NTGMEAS - NTGMEAS1, NTGMEAS2, NTGMEAS3 - ASSIGNMENTS BASED ON RANK USING THE FOLLOWING LOGIC RANDOMIZING WITHIN NTGMEAS OF THE SAME RANK]

[NOTE TO PROGRAMMER: TO REDUCE RESPONDENT BURDEN AND AVOID MID SURVEY DROPOUTS, WE WANT TO LIMIT THE NUMBER OF EQUIPMENT TO ASK ABOUT TO UP TO 3 EQUIPMENT TYPES PER RESPONDENT. AS SUCH, WE WILL GENERATE 3 NTGMEAS VARIABLES BASED ON CONFIRMATION OF RECEIPT OF EQUIPMENT IN IV1 AND THE ASSIGNED RANK ORDER IN THE FOLLOWING TABLE]

Criteria	NTGMEAS ASSIGNMENT	Rank Order
a. v_furn = 1	NTGMEAS1, OR NTGMEAS2, OR NTGMEAS3 = “Efficient furnace”	1
b. v_wheat = 1	NTGMEAS1, OR NTGMEAS2, OR NTGMEAS3 = “High efficiency water heater”	1
c. v_hpump = 1	NTGMEAS1, OR NTGMEAS2, OR NTGMEAS3 = “Heat pump”	1
d. v_stat = 1	NTGMEAS1, OR NTGMEAS2, OR NTGMEAS3 = “Smart thermostat”	1
e. v_pwrap = 1	NTGMEAS1, OR NTGMEAS2, OR NTGMEAS3 = “Pipe wrap”	2
f. v_dseal = 1	NTGMEAS1, OR NTGMEAS2, OR NTGMEAS3 = “Duct sealing”	2
g. v_in = 1	NTGMEAS1, OR NTGMEAS2, OR NTGMEAS3 = “Insulation”	2
h.v_sh = 1	NTGMEAS1, OR NTGMEAS2, OR NTGMEAS3 = “Low flow showerhead”	2
i. v_fa = 1	NTGMEAS1, OR NTGMEAS2, OR NTGMEAS3 = “Low flow faucet aerator”	2

Free Ridership [FOR EACH NTGMEAS1, NTGMEAS2, NTGMEAS3, ASK THE FOLLOWING QUESTIONS]

[NOTE TO PROGRAMMER: WE WANT TO ASK THIS IN A LOOP. FIRST ASK EACH QUESTION IN THIS SECTION ABOUT THE EQUIPMENT ASSIGNED AS NTGMEAS1, FOLLOWED BY NTGMEAS2, THEN]

["The next set of questions will ask about the equipment installed in your home through the program and how you made decisions about installing the equipment."]

FR1. At the time that you first heard about the availability of the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> through the program, had you…? [*READ LIST*] [1 = Yes, 2 = No, 8 = Don't know, 9 = Refused]

a. Already been thinking about installing the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3>? [IF FR1a <> 1, SKIP TO FR2]
b. Already begun collecting information about the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3>? [IF FR1b <> 1, SKIP TO FR2]
c. Already decided to buy the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3>? [IF FR1c <> 1, SKIP TO FR2]
d. Already had a contractor install the <NTGMEAS1 NTGMEAS2, OR NTGMEAS3>? [IF FR1d <> 1, SKIP TO FR2]

FR1BB. So, the <NTGMEAS1 NTGMEAS2, OR NTGMEAS3>, was installed before you learned about it from MCE?

1. (Yes) [SKIP TO FR5]
2. (No)
8. (Don't know)
9. (Refused)

FR2. Just to be sure I understand, did you have specific plans to install the <NTGMEAS1 NTGMEAS2, OR NTGMEAS3>, before learning about the free equipment available through the MCE program?

1. (Yes)
2. (No) [SKIP TO FR4]
8. (Don't know) [SKIP TO FR4]
9. (Refused) [SKIP TO FR4]

FR3. Did you have to make any changes to your existing plans to receive the free <NTGMEAS1 NTGMEAS2, OR NTGMEAS3> through the MCE's program?

1. (Yes)
2. (No)
8. (Don't know)
9. (Refused)

[ASK FOR EACH NTGMEAS1 NTGMEAS2, OR NTGMEAS3 IF FR3 = 1]

FR3B. What changes did you have to make to receive the free <NTGMEAS1 NTGMEAS2, OR NTGMEAS3> from MCE's program? [Record Open End, 8 = Don't know, 9 = Refused]

FR4. If the free <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> from MCE's program had not been available, would you have:

a. Purchased any <NTGMEAS1, NTGMEAS2, OR NTGMEAS3>? [1 = Yes, 2 = No, 8 = Don't know, 9 = Refused] [SKIP TO FR5 IF = 2]

b. Purchased the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> at the same time as you received it from MCE? [1 = Yes, 2 = No, 8 = Don't know, 9 = Refused] [SKIP TO FR4E IF = 1]

c. Had the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> installed earlier than you did, or later?

1. Earlier
2. Same Time [IF FR4C = 2, THEN UPDATE FR4B = 1]
3. Later
8. (Don't know) [SKIP TO FR4E]
9. (Refused) [SKIP TO FR4E]

[ASK IF FR4C = 1, 3]

FR4B2. How much [IF FR4C = 1 "earlier"; IF FR4C = 3, "later"] would you have hired a contractor for the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3>? An estimate of when is fine.

[Record Numeric Open End] _____ Years [AND/OR] _____Months
998. (Don't know)
999. (Refused)

FR4E. If the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> from the MCE program had not been available, would you have done anything else differently?

1. (Yes)
2. (No) [SKIP TO FR5]
8. (Don't know) [SKIP TO FR5]
9. (Refused) [SKIP TO FR5]

FR4E1. What would you have done differently? [Record Open End, 98 = Don't know, 99 = Refused]

FR5. On a 0 to 10 scale, with 0 being "not at all likely" and 10 being "very likely", how likely is it that you would have bought the same <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> equipment if you had not received any free <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> equipment from the program? [Record Numeric Open End, 0-10, 98 = Don't know, 99 = Refused]

[ASK IF FR5 > 6 AND NOT 98 OR 99]

FR5a. If you were to buy a <NTGMEAS1, NTGMEAS2, OR NTGMEAS3>, would you have…? [SINGLE RESPONSE, FORCED RESPONSE]

1. Purchased a more efficient <NTGMEAS1, NTGMEAS2, OR NTGMEAS3>
2. Purchased <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> with the same efficiency level
3. Purchased a less efficient <NTGMEAS1, NTGMEAS2, OR NTGMEAS3>
98. (Don't know)

"I'm going to read a few statements about how you came to choose to install the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3>. On a scale of 0 to 10, where 0 is strongly disagree and 10 is strongly agree, how much do you agree with each statement?"

FR10. There may have been several reasons for my decision to have this work performed, but the free equipment from the MCE program was a critical factor in my decision to have the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> installed. [Record Numeric Open End, 0-10, 98 = Don't know, 99 = Refused]

FR11. I would have installed the<NTGMEAS1, NTGMEAS2, OR NTGMEAS3> within a year of when I did even without the free equipment from MCE's program. [Record numeric open end, 0-10, 98 = Don't know, 99 = Refused]

Consistency Check and Resolution

[*C1 will be asked only for those respondents who have a clear inconsistency between responses (i.e., all but one of the questions are at one end of the spectrum for free ridership while one question is at the other spectrum.) The question responses that will be used to trigger C1 are:*

FR4A (efficiency enhancement measures)
FR5
FR10
FR11]

[IF FR4A = 1 AND FR5 = 0,1 AND FR10 = 9,10 AND FR11 = 0,1, ASK C1. INCONSISTENCY 1 =
'you would have installed the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> without the program']

[IF FR4A = 2 AND FR5 = 9,10 AND FR10 = 0,1 AND FR11 = 9,10, ASK C1. INCONSISTENCY 1
= 'you would not have installed the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> without the program']

[IF FR5 = 0,1 AND FR4A = 1 AND FR10 = 0,1 AND FR11 = 9,10, ASK C1. INCONSISTENCY 1 =
'you would likely not have installed the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> without the program']

[IF FR5 = 9,10 AND FR4A = 2 AND FR10 = 9,10 AND FR11 = 0,1, ASK C1. INCONSISTENCY 1
= 'you would likely have installed the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> without the program']

[IF FR10 = 0,1 AND FR4A = 2 AND FR5 = 0,1 AND FR11 = 0,1, ASK C1. INCONSISTENCY 1 =
'the program was not a critical factor in your decision to purchase or install the high efficiency/energy saving equipment]

[IF FR10 = 9,10 AND FR4A = 1 AND FR5 = 9,10 AND FR11 = 9,10, ASK C1. INCONSISTENCY
1 = 'the program was a critical factor in your decision to purchase or install the high efficiency/energy saving equipment']

[IF FR11 = 9,10 AND FR4A = 2 AND FR5 = 0,1 AND FR10 = 9,10, ASK C1. INCONSISTENCY 1
= 'you would have bought the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> within [a year/2 years] even without the program'

[IF FR11 = 0,1 AND FR4A = 1 AND FR5 = 9,10 AND FR10 = 0,1, ASK C1. INCONSISTENCY 1 =
'you would not have bought the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> within [a year/2 years] even without the program']

C1. Let me make sure I understand you. Earlier, you said <Read in INCONSISTENCY 1 Text>, but that differs from some of your other responses. Please tell me in your own words what influence, if any, the program had on your decision to purchase or install the <NTGMEAS1, NTGMEAS2, OR NTGMEAS3> at the time you did? [Record Open End, 98 = Don't know, 99 = Refused]

Spillover [ASK ONCE FOR ALL]

NSP1. Since you participated in MCE's Home Energy Savings Program, have you purchased and installed any other type of high efficiency equipment or made other energy saving improvements in your home?

1. (Yes)
2. (No) [Skip to Demographics Section]
8. (Don't Know) [Skip to Demographics Section]
9. (Refused) [Skip to Demographics Section]

[ASK IF NSP1 = 1]

NSP1B. Did you receive any assistance in the form of a rebate, discount, or incentive for the energy saving equipment or energy saving improvement(s) through MCE's Home Energy Savings Program or another utility or non-utility program?

1. (Yes) [Skip to Demographics Section]
2. (No)
8. (Don't know)
9. (Refused)

NSP2. What type and how many of each type of high efficiency equipment did you install on your own? [Open end, 998 = Don't know, 999 = Refused] [Multiple Response]

Equipment Type	Quantity
a. [Record open end]	aa. [Record numeric open end]
b. [Record open end]	bb. [Record numeric open end]
c. [Record open end]	cc. [Record numeric open end]
d. [Record open end]	dd. [Record numeric open end]
e. [Record open end]	ee. [Record numeric open end]
f. [Record open end]	ff. [Record numeric open end]
g. [Record open end]	gg. [Record numeric open end]

[*Ask for each type of equipment in NSP2, where NSP2 <> 998, 999*]

NSP3. How do you know that this equipment is energy saving? [*If needed: "Is it ENERGY STAR® Rated?"*] [*Record Open end for each equipment in NSP2*]

Record Open End Responses
a. <Read in response from NSP2a, if any> [Record Open end, 8 = Don't know, 9 = Refused]
b. <Read in response from NSP2b, if any> [Record Open end, 8 = Don't know, 9 = Refused]
c. <Read in response from NSP2c, if any> [Record Open end, 8 = Don't know, 9 = Refused]
d. <Read in response from NSP2d, if any> [Record Open end, 8 = Don't know, 9 = Refused]
e. <Read in response from NSP2e, if any> [Record Open end, 8 = Don't know, 9 = Refused]
f. <Read in response from NSP2f, if any> [Record Open end, 8 = Don't know, 9 = Refused]
g. <Read in response from NSP2g, if any> [Record Open end, 8 = Don't know, 9 = Refused]

NSP4. I'm going to read a statement about the energy saving equipment that you purchased on your own. On a scale from 0 to 10, with 0 indicating that you "strongly disagree", and 10 indicating that you "strongly agree", please rate the following statement.

a. My experience with the MCE Home Energy Savings Program in 2021 influenced my decision to install different types of high efficiency equipment on my own. [Record numeric open end, 0 – 10, 98 = Don't know, 99 = Refused]

NSP5. Why did you purchase this high efficiency equipment without going through an MCE or other utility program? [*Read response options if needed*] [MULTIPLE RESPONSE]

NSP5_1. (Too much paperwork)
NSP5_2. (Takes too long to get approval)
NSP5_3. (No time to participate, needed equipment immediately)
NSP5_4. (The program had ended)
NSP5_5. (The equipment would not qualify)
NSP5_6. (The amount of the rebate wasn't important enough)
NSP5_7. (Did not know program was available)
NSP5_8. (There was no program available)
NSP5_0. (Other, SPECIFY [Record Open end])
NSP5_98 (Don't know)
NSP5_11 (Refused)

Demographics [ASK ALL]

Thank you for your responses so far. We are almost done. My last set of questions asks about household characteristics.

D1. Do you own or rent your home?

1. (Own)
2. (Rent)
0. (Other (Specify [Record Open end]))
8. (Don't know)
9. (Refused)

D2. In what type of building do you live? [*Read list if needed*]

1. (A one-family home detached from any other house)
2. (A building with 5 or more apartments)
3. (A mobile home)
4. (Boat, RV, van, etc.)
0. (Other (SPECIFY [Record Open End]))
8. (Don't know)
9. (Refused)

D3. About when was this home or building first built? [*Read list if needed*]

1. (Before 1970's)

2. (1970's)
3. (1980's)
4. (1990-94)
5. (1995-99)
6. (2000's)
0. (Other (SPECIFY [Record Open end]))
8. (Don't know)
9. (Refused)

D4. Including yourself, how many people currently live in your home year-round? [Open end, 8 = Don't know, 9 = Refused]

D5. What is your primary heating fuel, electric or gas?
1. (Electric)
2. (Gas)
0. (Other (SPECIFY [Record Open End]))
8. (Don't know)
9. (Refused)

D6. What is your primary water heating fuel, electric or gas?

3. (Electric)
4. (Gas)
5. (Other (SPECIFY [Record Open end]))
8. (Don't know)
9. (Refused)

D7. Does your home have solar panels?

0. (Yes)
1. (No)
8. (Don't know)
9. (Refused)

Closing

[READ FOR ALL]

Those are all the questions I have for you today. On behalf of the California Public Utilities Commission, thank you for taking the time to complete this survey. Your feedback is much appreciated!

CL1. [*Note to Interviewer: Please note down any and all additional questions, comments, or feedback from respondent regarding MCE or MCE's program. If no additional comment or questions, leave blank.*] [OPEN END RESPONSE, ALLOW BLANK/SKIP]

0. [OPEN END RESPONSE]

[*Note to Interviewer: If needed, you may provide MCE's mail address, info@mcecleanenergy.org, to the respondent in case they have any questions or would like for MCE staff to reach out to them. They just need to mention the MCE Home Energy Savings Program and their question or concern.*]

Appendix F. Multifamily Survey Instrument

Instrument Information

Table 33 includes key characteristics about the instrument.

Table 33. Overview of Data Collection Activity

Descriptor	This Instrument
Instrument Type	In-depth interview
Estimated Time to Complete	15-20 minutes
Population Description	Participating multifamily properties in 2021
Population Size	Four (3 property managers and 1 customer) representing 355 residential units
Contact List Size	4
Completion Goal(s)	N.A. (Census)
Contact List Source and Date	MCE program tracking data
Type of Sampling	Census
Contact Sought	Property managers and/or MCE customer account contact
Incentive Types and Amounts	None
Outreach Methods	Outbound calling, email
Fielding Firm	Opinion Dynamics

Program Description

MCE's Multifamily program is targeted to low-income and market rate residents and owners of multifamily buildings in MCE's service area. Through its implementer, the Association for Energy Affordability (AEA), MCE offers no-cost property assessments, project scope development, and technical assistance throughout the lifetime of the projects carried out under this program. Owner rebates and direct installation are provided for a set of energy efficiency measures specifically tailored for multifamily properties. Energy efficient equipment offered by this program include:

- Domestic hot water pump
  - DHW pump demand control, gas, 50 units, Htl, CZ02
- Faucet aerator
  - 1.0 GPM Low Flow Kitchen Aerators
- Lighting
  - Common area and exterior lighting
- Refrigeration
  - ENERGY STAR top freezer, no ice, medium (15 - 20 cu ft)
  - ENERGY STAR refrigerator

Research Objectives

The objective for this task is to collect information from MCE Multifamily program participants that will inform net-to-gross (NTG) analysis. Data gathered through this instrument will be used to determine free ridership and spillover, which will be used to calculate measure type level net-to-gross ratios (NTGR).

Instrument Guide

Table 29Table 34 details the research topics and corresponding sections in this in-depth interview guide.

Table 34. Research Topics and Corresponding Sections

Research Topic	Section
General customer information	Hello, my name is <INTERVIEWER NAME>, and I'm calling on behalf of the California Public Utilities Commission regarding MCE's Multifamily Program. May I speak with [contact name]? [*Note to Interviewer: If contact unavailable, ask for the person or staff who makes decisions on how property uses energy or energy using equipment.*] I'm with Opinion Dynamics, an independent research firm that works with the California Public Utilities Commission. I am calling to learn about your experiences with the free energy saving equipment your property received through MCE's Multifamily Program. I am not selling anything. The information you provide will help determine energy savings achieved by the program and enhance MCE's program offerings for participating multifamily properties like yours. Rest assured that your responses will be kept confidential and will only be used in aggregate along with other program participants' responses. [*If needed: Should you have any questions regarding this study or wish to contact CPUC, you may contact Peng Gong, the CPUC lead for this study, at peng.gong@cpuc.ca.gov*] [*If needed: This interview should take about 15 minutes of your time, depending on your responses.*] [*Additional information if needed:* ■ *Who is doing this study: The California Public Utilities Commission, which regulates the utilities, is overseeing evaluations of most of California's energy efficiency programs.* ■ *Why are you conducting this study: Studies like this help the State of California and MCE better understand customers' need for and interest in energy programs and services.*] Is this a good time for us to speak with you? [*IF NOT, SET UP CALL BACK APPOINTMENT.*] [If yes] For note taking purposes, would it be okay if I record this conversation? [Ask all] Screening
General customer information	**Installation Verification** IV1. Now, I would like to understand what you did with the energy saving equipment your property received through MCE's Multifamily program. [*Fill out table below*] a. How many of each equipment did your property receive through the program? b. Were the following equipment you received through the program installed? c. How many were installed? d. Are they still installed?

<table>
<tr><th>Research Topic</th><th>Section</th></tr>
<tr><td></td><td>
<table>
<tr><th>Equipment</th><th>a. How many received? (Quantity)</th><th>b. Installed (Y/N/DK)</th><th>c. How many were installed? (Quantity)</th><th>d. Are they still installed? (Y/N/DK)</th></tr>
<tr><td>Domestic hot water pump (i.e., Gas-fired water heater delivered via a pump or demand control for centralized water heater recirculation pump)</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Low flow faucet aerators</td><td></td><td></td><td></td><td></td></tr>
<tr><td>LED lighting for common areas and exterior</td><td></td><td></td><td></td><td></td></tr>
<tr><td>ENERGY STAR® rated freezer</td><td></td><td></td><td></td><td></td></tr>
<tr><td>ENERGY STAR® rated refrigerator</td><td></td><td></td><td></td><td></td></tr>
</table>
Respondent Background Information</td></tr>
<tr><td>Measure Verification</td><td>Installation Verification</td></tr>
<tr><td>Free-Ridership (by measure type)</td><td>Free Ridership</td></tr>
<tr><td>Spillover</td><td>FR1. At the time that you first heard about the energy saving equipment from MCE, had you…? [Read list until Respondent says ‘no’.] [Note to Interviewer, please ask and record response for each type of equipment]
1. Already been thinking about purchasing <EQUIPMENT TYPE 1, EQUIPMENT TYPE 2, EQUIPMENT TYPE 3, etc.>? [Probe to confirm that the response is the same for all equipment they received from the program] [If no, skip to FR2]
2. Already begun collecting information about energy saving <EQUIPMENT TYPE 1, EQUIPMENT TYPE 2, EQUIPMENT TYPE 3, etc.>? Probe to confirm that the response is the same for all equipment they received from the program] [If no, skip to FR2]
3. Already selected the energy saving equipment you were going to get? [If no, skip to FR2]
4. Already installed the <EQUIPMENT TYPE 1, EQUIPMENT TYPE 2, EQUIPMENT TYPE 3, etc.>? Probe to confirm that the response is the same for all equipment they received from the program]? [If yes, skip to FR1B; else FR2]
7. (Other) SPECIFY _____ [Skip to FR2]
98. (Don’t Know) [Skip to FR2]
99. (Refused) [Skip to FR2]
FR1B. So, the <EQUIPMENT 1, EQUIPMENT 2, EQUIPMENT 3, EQUIPMENT 4, etc.> were installed before you learned about the rebate from MCE? (Note to Interviewer, please ask and record response for each type of equipment)
1. Yes (Skip to FR5)
2. No
98. (Don’t Know)
99. (Refused)
FR2. Just to be sure I understand, did you have specific plans to install energy efficient equipment [If needed: “such as lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump” before learning about the rebate available through MCE?] (Note to Interviewer, please ask and record response for each type of equipment.)
1.Yes
2. No (Skip to FR4)
98. (Don’t Know) (Skip to FR4)</td></tr>
</table>

Research Topic	Section
	99. (Refused) (Skip to FR4) FR3. Did you have to make any changes to your existing plans to receive the rebate through MCE's Multifamily program? 1. Yes 2. No 98. (Don't Know) 99. (Refused) FR4. [*Repeat as needed for FR4 Parts A - D*] If the rebate from MCE had not been available, would you still have:FR4A. Purchased efficient **<**lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump**>**? (*Note to Interviewer, please ask and record response for each type of equipment*) 1. Yes 2. No (Skip to FR5) 88. (Don't Know) 99. (Refused) FR4B. Purchased the efficient **<**lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump**>** at the same time as you did? (*Note to Interviewer, please ask and record response for each type of equipment*) 1. Yes (Skip to FR4C) 2. No 88. (Don't Know) (Skip to FR4C) 99. (Refused) (Skip to FR4C) FR4B1. Bought the efficient **<**lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump**>** earlier than you did, or later? (Note to Interviewer, please ask and record response for each type of equipment) 1. Earlier 2. Same Time (Repeat question FR4B) 3. Later 88. (Don't Know) (Skip to FR4C) 99. (Refused) (Skip to FR4C) FR4B2. How much [FR4B1. earlier/later] would you have bought the efficient **<**lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump**>**? (*Note to Interviewer, please ask and record response for each type of equipment*) _____ Years {AND/OR} _____Months 88. (Don't Know) 99. (Refused) FR4C. [*If purchased multiple units through the program*] Without MCE's Multifamily program, would you have purchased the same quantity as you did? (*Note to Interviewer, please ask and record response for each type of equipment*) 1. Yes (Skip to FR4D) 2. No 88. (Don't Know) (Skip to FR4D) 99. (Refused) (Skip to FR4D) FR4C1. How many/much of the energy efficient **<**lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump**>** would you have purchased without the program? (Note to Interviewer, please ask and record response for each type of equipment) _____ {RECORD NUMBER} 88. (Don't Know) 99. (Refused)

Research Topic	Section
	FR4D. Purchased the same efficiency of <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump>? (Note to Interviewer, please ask and record response for each type of equipment) 1. Yes 2. No 88. (Don't Know) 99. (Refused) FR4E. If the rebate from MCE had not been available, would you have done anything else differently? 1. Yes 2. No (Skip to FR5) 88. (Don't Know) (Skip to FR5) 99. (Refused (Skip to FR5) FR4E1 What would you have done differently? [Record response (0-10)]: _____ FR5. On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is it that you would have bought the same energy efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump> if you had not received any rebates from the program? (Note to Interviewer, please ask and record response for each type of equipment) [Record response (0-10)]: _____ (Skip to FR7) 88. (Don't Know) {(Skip to FR7) 99. (Refused) (Skip to FR7) {SKIP TO FR10 IF PROGRAM DATABASE DOES NOT CONTAIN INCENTIVE INFORMATION} [*Note to Interviewer: Per program tracking data, under Total Gross Incentive, each property received a rebate/incentive, as such we should as FR7 onward.*] FR7. Our records indicate you received about <TOTAL GROSS INCENTIVE> from MCE's Multifamily program either directly or at the time of purchase to offset the cost of the [EQUIPMENT TYPE 1, EQUIPMENT TYPE 2, EQUIPMENT TYPE 3, etc.]. Does this amount sound right? (*Note to Interviewer, please ask and record response for each type of equipment*) 1. Yes (Skip to FR9) 2. No 88. (Don't Know) (Skip to FR9) 99. (Refused) (Skip to FR9) FR8. What would you estimate to be the actual amount? (Note to Interviewer, please ask and record response for each type of equipment) [Record response (0-10)]: _____ _____ {SET = NEW AMOUNT OF [INCENTIVE]} 88 (Don't Know) 99. (Refused) I'm going to read several statements about how you came to choose your efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump>. On a scale of 0 to 10, where 0 is strongly disagree and 10 is strongly agree, how much do you agree with each statement? (*Note to Interviewer, please ask and record response for each type of equipment*) FR9. If I had not had any assistance from the program, I would have paid the additional <TOTAL GROSS INCENTIVE> to buy the energy efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump> on my own? (*Note to Interviewer, please ask and record response for each type of equipment*) [Record response (0-10)}: _____ 88. (Don't Know) 99. (Refused) [*Read only if FR7-FR9 were skipped*]: I'm going to read several statements about how you came to choose your energy efficient <lighting, kitchen appliances, water conservation measures, efficient

Research Topic	Section
	domestic hot water pump>. On a scale of 0 to 10, where 0 is "strongly disagree" and 10 is "strongly agree", how much do you agree with each statement? (*Note to Interviewer, please ask and record response for each type of equipment*) FR10. There may have been several reasons for my purchase decision. But the rebate from MCE was a critical factor in my decision to purchase the high efficiency/energy efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump>. (*Note to Interviewer, please ask and record response for each type of equipment*) [Record response (0-10)}: _____ 88. (Don't Know) 99. (Refused) FR11. I would have bought energy efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump> within a year of when I did even without the rebate from MCE. (*Note to Interviewer, please ask and record response for each type of equipment*) [Record response (0-10)}: _____ 88. (Don't Know) 99. (Refused) **Consistency Check & Resolution** [*C1 will be asked only for those respondents who have a clear inconsistency between responses (i.e., all* *but one of the questions are at one end of the spectrum for free ridership while one question is at the other spectrum.) The question responses that will be used to trigger C1 are:* FR4A (efficiency enhancement measures) OR FR4D (incremental efficiency measures) FR5 FR10 FR11 {IF FR4A/D = 1 AND FR5 = 0,1 AND FR10 = 9,10 AND FR11 = 0,1, ASK C1. INCONSISTENCY 1 = 'you would have purchased the energy efficient [product type] without the program'} {IF FR4A/D = 2 AND FR5 = 9,10 AND FR10 = 0,1 AND FR11 = 9,10, ASK C1. INCONSISTENCY 1 = 'you would not have purchased the energy efficient [product type] without the program'} {IF FR5 = 0,1 AND FR4A/D = 1 AND FR10 = 0,1 AND FR11 = 9,10, ASK C1. INCONSISTENCY 1 = 'you would likely not have purchased the energy efficient [product type] without the program'} {IF FR5 = 9,10 AND FR4A/D = 2 AND FR10 = 9,10 AND FR11 = 0,1, ASK C1. INCONSISTENCY 1 = 'you would likely have purchased the energy efficient [product type] without the program'} {IF FR10 = 0,1 AND FR4A/D = 2 AND FR5 = 0,1 AND FR11 = 0,1, ASK C1. INCONSISTENCY 1 = 'the program was not a critical factor in your decision to purchase the high efficiency/energy efficient [product type] without the program'} {IF FR10 = 9,10 AND FR4A/D = 1 AND FR5 = 9,10 AND FR11 = 9,10, ASK C1. INCONSISTENCY 1 = 'the program was a critical factor in your decision to purchase the high efficiency/energy efficient [product type] without the program'} {IF FR11 = 9,10 AND FR4A/D = 2 AND FR5 = 0,1 AND FR10 = 9,10, ASK C1. INCONSISTENCY 1 = 'you would have bought the [product type] within a year even without the program'}

Research Topic	Section
	{IF FR11 = 0,1 AND FR4A/D = 1 AND FR5 = 9,10 AND FR10 = 0,1, ASK C1. INCONSISTENCY 1 = 'you would not have bought the [product type] within a year even without the program'} C1. Let me make sure I understand you. Earlier, you said [fill with Inconsistency 1], but that differs from some of your other responses. Please tell me in your own words what influence, if any, the program had on your decision to purchase and install the [EQUIPMENT TYPE 1, EQUIPMENT TYPE 2, EQUIPMENT TYPE 3, etc.] at the time you did? (Record verbatim response below] C2. [*fill with wording and response categories to the one question which was inconsistent*] [*Interviewer: Based on verbatim response to C1, please record new response below*] [*Ask all*] Spillover
General customer information	Firmographics

Instrument

Introduction/Call Script

Hello, my name is <INTERVIEWER NAME>, and I'm calling on behalf of the California Public Utilities Commission regarding MCE's Multifamily Program. May I speak with [contact name]?
[*Note to Interviewer: If contact unavailable, ask for the person or staff who makes decisions on how property uses energy or energy using equipment.*]

I'm with Opinion Dynamics, an independent research firm that works with the California Public Utilities Commission. I am calling to learn about your experiences with the free energy saving equipment your property received through MCE's Multifamily Program. I am not selling anything. The information you provide will help determine energy savings achieved by the program and enhance MCE's program offerings for participating multifamily properties like yours. Rest assured that your responses will be kept confidential and will only be used in aggregate along with other program participants' responses.

> [*If needed: Should you have any questions regarding this study or wish to contact CPUC, you may contact Peng Gong, the CPUC lead for this study, at peng.gong@cpuc.ca.gov*]
>
> [*If needed: This interview should take about 15 minutes of your time, depending on your responses.*]
>
> [*Additional information if needed:*
>
> - *Who is doing this study: The California Public Utilities Commission, which regulates the utilities, is overseeing evaluations of most of California's energy efficiency programs.*
> - *Why are you conducting this study: Studies like this help the State of California and MCE better understand customers' need for and interest in energy programs and services.*]

Is this a good time for us to speak with you? [*IF NOT, SET UP CALL BACK APPOINTMENT.*]

[If yes] For note taking purposes, would it be okay if I record this conversation?

[Ask all]

Screening

Thank you for agreeing to participate in this study. Before we continue, I'd like to confirm the energy saving equipment that your property at <READ IN PROPERTY ADDRESS OR PROPERTY NAME> received as part of your participation in MCE's Energy Savings Program.

S1. Based on program records, your property received the following equipment as part of your participation in the program. Is/Are these correct? [*POPULATE TABLE USING CLAIMS DATA*]

Equipment	Reported in Program Tracking Data (Y/N)	Confirmed by Respondent (Y/N/DK)	Notes
Domestic Hot Water			
Domestic hot water pump (i.e., Gas-fired water heater delivered via a pump or demand control for centralized water heater recirculation pump)			
Water Conservation			
Low flow faucet aerators			
Lighting			
LED lighting for common areas and exterior			
Refrigeration			
ENERGY STAR® rated freezer			
ENERGY STAR® rated refrigerator			

[*If S1 = No or Don't know to all measures, Thank and Terminate. Terminate script: "Those are all the questions I have for you today. Thank you for your willingness to participate in this study."*]

Installation Verification

IV1. Now, I would like to understand what you did with the energy saving equipment your property received through MCE's Multifamily program. [*Fill out table below*]

e. How many of each equipment did your property receive through the program?
f. Were the following equipment you received through the program installed?
g. How many were installed?
h. Are they still installed?

Equipment	a. How many received? (Quantity)	b. Installed (Y/N/DK)	c. How many were installed? (Quantity)	d. Are they still installed? (Y/N/DK)
Domestic hot water pump (i.e., Gas-fired water heater delivered via a pump or demand control for centralized water heater recirculation pump)				
Low flow faucet aerators				
LED lighting for common areas and exterior				
ENERGY STAR® rated freezer				
ENERGY STAR® rated refrigerator				

Respondent Background Information

Before we proceed, we would like to collect some information regarding your role in the property.

R1. Could you please tell us about your role in the property located at <READ IN PROPERTY NAME AND ADDRESS> and what your responsibilities are as part of your role? [Probe: owner, property manager]

R2. When it comes to energy use and/or purchasing or installing energy using equipment for the property, how involved are you in decision-making?

[*Ask if Respondent is not the right contact*]

R2a. Is there someone who may be more knowledgeable about the energy related upgrades your property received through the program who we could speak with?

R3. And approximately how many years have you worked at <PROPERTY NAME>?

0. [RECORD RESPONSE]
98. (Don't know)
99. (Refused)

Property Background Information

Before we go into the energy saving equipment your property received through the program, we'd like to gather some background information regarding the property.

P1. First, how many buildings are at this location [*If needed: Read property name or address*]?

P2. How many units does the property have?

P3. Are they all residential units? *[NOTE: Here in the Bay Area, there are properties that rent out the units in the first floor to commercial tenants.*]

P4. Does the property have central heating and/or cooling systems?

P5. Are the tenants responsible for paying their own utility bills or are utilities included in the rent? If so, which utilities are tenants responsible for and which ones are included in the rent?

P6. Is the electricity for the tenant units at this property individually-metered or master-metered? In other

words, are there many meters or is there just one electric meter for several tenants?

P7. Is the natural gas for the tenant units at this property individually-metered or master-metered?

Free Ridership

The next set of questions are regarding the equipment installed in your property through MCE's Energy Savings Program and how you made decisions on installing the equipment.

FR1. At the time that you first heard about the energy saving equipment from MCE, had you…? [R*ead list until Respondent says 'no'.*] [*Note to Interviewer, please ask and record response for each type of equipment*]

1. Already been thinking about purchasing **<**EQUIPMENT TYPE 1, EQUIPMENT TYPE 2, EQUIPMENT TYPE 3, etc.**>**? [*Probe to confirm that the response is the same for all equipment they received from the program*] [If no, skip to FR2]
2. Already begun collecting information about energy saving **<**EQUIPMENT TYPE 1, EQUIPMENT TYPE 2, EQUIPMENT TYPE 3, etc**.>**? *Probe to confirm that the response is the same for all equipment they received from the program*] [If no, skip to FR2]
3. Already selected the energy saving equipment you were going to get? [If no, skip to FR2]
4. Already installed the **<**EQUIPMENT TYPE 1, EQUIPMENT TYPE 2, EQUIPMENT TYPE 3, etc**.>**? *Probe to confirm that the response is the same for all equipment they received from the program*]? [If yes, skip to FR1B; else FR2]

7. (Other) SPECIFY _____ [Skip to FR2]
98. (Don't Know) [Skip to FR2]
99. (Refused) [Skip to FR2]

FR1B. So, the **<**EQUIPMENT 1, EQUIPMENT 2, EQUIPMENT 3, EQUIPMENT 4, etc.**>** were installed before you learned about the rebate from MCE? (*Note to Interviewer, please ask and record response for each type of equipment*)

3. Yes (Skip to FR5)
4. No

98. (Don't Know)
99. (Refused)

FR2. Just to be sure I understand, did you have specific plans to install energy efficient equipment [*If needed: "such as lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump" before learning about the rebate available through MCE?*] (*Note to Interviewer, please ask and record response for each type of equipment.*)

5. Yes
6. No (Skip to FR4)

98. (Don't Know) (Skip to FR4)
99. (Refused) (Skip to FR4)

FR3. Did you have to make any changes to your existing plans to receive the rebate through MCE's Multifamily program?

7. Yes

8. No
98. (Don't Know)
99. (Refused)

FR4. [*Repeat as needed for FR4 Parts A - D*] If the rebate from MCE had not been available, would you still have:FR4A. Purchased efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump>? (*Note to Interviewer, please ask and record response for each type of equipment*)
1. Yes
2. No (Skip to FR5)
88. (Don't Know)
99. (Refused)

FR4B. Purchased the efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump> at the same time as you did? (*Note to Interviewer, please ask and record response for each type of equipment*)

1. Yes (Skip to FR4C)
2. No
88. (Don't Know) (Skip to FR4C)
99. (Refused) (Skip to FR4C)

FR4B1. Bought the efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump> earlier than you did, or later? (Note to Interviewer, please ask and record response for each type of equipment)

1. Earlier
2. Same Time (Repeat question FR4B)
3. Later
88. (Don't Know) (Skip to FR4C)
99. (Refused) (Skip to FR4C)

FR4B2. How much [FR4B1. earlier/later] would you have bought the efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump>? (*Note to Interviewer, please ask and record response for each type of equipment*)

_____ Years {AND/OR} _____Months
88. (Don't Know)
99. (Refused)

FR4C. [*If purchased multiple units through the program*] Without MCE's Multifamily program, would you have purchased the same quantity as you did? (*Note to Interviewer, please ask and record response for each type of equipment*)

1. Yes (Skip to FR4D)
2. No
88. (Don't Know) (Skip to FR4D)
99. (Refused) (Skip to FR4D)

FR4C1. How many/much of the energy efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump> would you have purchased without the program? (Note to Interviewer, please ask and record response for each type of equipment)

_____ {RECORD NUMBER}
88. (Don't Know)
99. (Refused)

FR4D. Purchased the same efficiency of <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump>? (Note to Interviewer, please ask and record response for each type of equipment)

1. Yes
2. No
88. (Don't Know)
99. (Refused)

FR4E. If the rebate from MCE had not been available, would you have done anything else differently?

1. Yes
2. No (Skip to FR5)
88. (Don't Know) (Skip to FR5)
99. (Refused (Skip to FR5)

FR4E1 What would you have done differently?
[Record response (0-10)]: _____

FR5. On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is it that you would have bought the same energy efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump> if you had not received any rebates from the program? (Note to Interviewer, please ask and record response for each type of equipment)

[Record response (0-10)]: _____ (Skip to FR7)
88. (Don't Know) {(Skip to FR7)
99. (Refused) (Skip to FR7)

{SKIP TO FR10 IF PROGRAM DATABASE DOES NOT CONTAIN INCENTIVE INFORMATION} [*Note to Interviewer: Per program tracking data, under Total Gross Incentive, each property received a rebate/incentive, as such we should as FR7 onward*.]

FR7. Our records indicate you received about <TOTAL GROSS INCENTIVE> from MCE's Multifamily program either directly or at the time of purchase to offset the cost of the [EQUIPMENT TYPE 1, EQUIPMENT TYPE 2, EQUIPMENT TYPE 3, etc.]. Does this amount sound right? (*Note to Interviewer, please ask and record response for each type of equipment*)

1. Yes (Skip to FR9)
2. No
88. (Don't Know) (Skip to FR9)
99. (Refused) (Skip to FR9)

FR8. What would you estimate to be the actual amount? (Note to Interviewer, please ask and record response for each type of equipment)

[Record response (0-10)]: _____ _____ {SET = NEW AMOUNT OF [INCENTIVE]}
88 (Don't Know)
99. (Refused)

I'm going to read several statements about how you came to choose your efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump>. On a scale of 0 to 10, where 0 is strongly disagree and 10 is strongly agree, how much do you agree with each statement? (*Note to Interviewer, please ask and record response for each type of equipment*)

FR9. If I had not had any assistance from the program, I would have paid the additional <TOTAL GROSS INCENTIVE> to buy the energy efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump> on my own? (*Note to Interviewer, please ask and record response for each type of equipment*)

[Record response (0-10)}: _____
88. (Don't Know)
99. (Refused)

[*Read only if FR7-FR9 were skipped*]: I'm going to read several statements about how you came to choose your energy efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump>. On a scale of 0 to 10, where 0 is "strongly disagree" and 10 is "strongly agree", how much do you agree with each statement? (*Note to Interviewer, please ask and record response for each type of equipment*)

FR10. There may have been several reasons for my purchase decision. But the rebate from MCE was a critical factor in my decision to purchase the high efficiency/energy efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump>. (*Note to Interviewer, please ask and record response for each type of equipment*)

[Record response (0-10)}: _____
88. (Don't Know)
99. (Refused)

FR11. I would have bought energy efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump> within a year of when I did even without the rebate from MCE. (*Note to Interviewer, please ask and record response for each type of equipment*)

[Record response (0-10)}: _____
88. (Don't Know)
99. (Refused)

Consistency Check & Resolution

[*C1 will be asked only for those respondents who have a clear inconsistency between responses (i.e., all but one of the questions are at one end of the spectrum for free ridership while one question is at the other spectrum.) The question responses that will be used to trigger C1 are:*

FR4A (efficiency enhancement measures) OR FR4D (incremental efficiency measures)
FR5
FR10
FR11

{IF FR4A/D = 1 AND FR5 = 0,1 AND FR10 = 9,10 AND FR11 = 0,1, ASK C1. INCONSISTENCY 1 = 'you would have purchased the energy efficient [product type] without the program'}

{IF FR4A/D = 2 AND FR5 = 9,10 AND FR10 = 0,1 AND FR11 = 9,10, ASK C1. INCONSISTENCY 1 = 'you would not have purchased the energy efficient [product type] without the program'}

{IF FR5 = 0,1 AND FR4A/D = 1 AND FR10 = 0,1 AND FR11 = 9,10, ASK C1. INCONSISTENCY 1 = 'you would likely not have purchased the energy efficient [product type] without the program'}

{IF FR5 = 9,10 AND FR4A/D = 2 AND FR10 = 9,10 AND FR11 = 0,1, ASK C1. INCONSISTENCY 1 = 'you would likely have purchased the energy efficient [product type] without the program'}

{IF FR10 = 0,1 AND FR4A/D = 2 AND FR5 = 0,1 AND FR11 = 0,1, ASK C1. INCONSISTENCY 1 = 'the program was not a critical factor in your decision to purchase the high efficiency/energy efficient [product type] without the program'}

{IF FR10 = 9,10 AND FR4A/D = 1 AND FR5 = 9,10 AND FR11 = 9,10, ASK C1. INCONSISTENCY 1 = 'the program was a critical factor in your decision to purchase the high efficiency/energy efficient [product type] without the program'}

{IF FR11 = 9,10 AND FR4A/D = 2 AND FR5 = 0,1 AND FR10 = 9,10, ASK C1. INCONSISTENCY 1 = 'you would have bought the [product type] within a year even without the program'}

{IF FR11 = 0,1 AND FR4A/D = 1 AND FR5 = 9,10 AND FR10 = 0,1, ASK C1. INCONSISTENCY 1 = 'you would not have bought the [product type] within a year even without the program'}

C1. Let me make sure I understand you. Earlier, you said [fill with Inconsistency 1], but that differs from some of your other responses. Please tell me in your own words what influence, if any, the program had on your decision to purchase and install the [EQUIPMENT TYPE 1, EQUIPMENT TYPE 2, EQUIPMENT TYPE 3, etc.] at the time you did? (Record verbatim response below]

C2. [*fill with wording and response categories to the one question which was inconsistent*]
[*Interviewer: Based on verbatim response to C1, please record new response below*]

[*Ask all*]

Spillover (Program Attribution)

LSP1. Since you received a rebate from MCE's Multifamily program, have you purchased and installed any energy efficient <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump> on your own without any assistance from the MCE's or another utility's program either at this property or at other locations?

1. Yes, only at this multifamily complex
2. Yes, only at other locations
3. Yes, at this facility and other locations
4. No [Skip to 5.3]
88. (Don't Know) [Skip to 5.3]
99. (Refused) [Skip to 5.3]

LSP2. How many more high efficiency <lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump> products did you buy on your own, compared to what you got through the program

at this property and/or at another location? [*Probe for percent or share of program equipment. Read the following if needed*]

For example, was it about one-fourth (25%) of what you installed through the program, one-half (50%) of what your installed through the program, the same amount as what you installed though the program (100%), twice as much as what you installed through the program (200%), or some other amount?

_____% at this multifamily complex
_____% at another property
88. (Don't Know)
99. (Refused)

LSP3. I'm going to read a statement about the equipment that you purchased on your own, without any assistance from your utility. On a scale from 0 to 10, with 0 indicating that you "strongly disagree" and 10 indicating that you "strongly agree", please rate the following statement:

My experience with the energy efficient **<**lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump**>** installed through the MCE's Multifamily program in 2021 influenced my decision to install more high efficiency lighting products on my own.

[Record response (0-10)]: _____
88. (Don't Know)
99. (Refused)

LSP4. Why did you purchase the energy efficient **<**lighting, kitchen appliances, water conservation measures, efficient domestic hot water pump**>** without the financial assistance available from MCE?

[*Do not read; indicate all that apply*]

1. (Too much paperwork)
2. (Takes too long to get approval)
3. (No time to participate, needed equipment immediately)
4. (The program had ended)
5. (The equipment would not qualify) [Probe why not] _____
6. (The amount of the rebate wasn't important enough)
7. (Other) SPECIFY _____
88. (Don't Know)
99. (Refused)

For our next set of questions, we are going to ask you to rate the importance of the program as well as other factors that might influence your decision to install the energy saving equipment you received through MCE's Multifamily program.

SO1. On a scale from 0 to 10, where 0 means "not at all important" and 10 means "very important", how would you rate the importance of the following on your decision to install the energy saving equipment you received through the program?

Category	Rating (0-10)	Don't Know/Refused/Not Applicable
a. The age or condition of the old equipment		
b. The availability of the MCE rebate		
c. The information provided through the energy assessment (audit) or other types of technical assistance provided through MCE's Multifamily program		
d. The recommendation from the program representative or equipment vendor		
e. Your previous experience with the same type/s of equipment/retrofit/upgrade		
f. Your previous experience with the MCE's or other utility's Multifamily energy efficiency rebate program		
g. Information from the program or through a training course		
h. Information from MCE Multifamily program marketing materials		
i. Suggestions from MCE's account representative		
j. Payback or return on the equipment upgrade/s		
k. Increased value of your property		
l. Compliance with city, state, or federal government regulations		
m. Compliance with your property's normal maintenance or retrocommissioning policies		

SO2. How does your company policy influence your decision to install energy saving equipment?

[Ask all]

Firmographics

Thank you for your responses so far. Our last set of questions aims to gather general information regarding the property you own/manage.

F1. Is the property that we discussed master-metered (e.g., one meter for the entire property) or individually-metered (e.g., a meter for each building and the property)?

1. Master-metered
2. Individually-metered
7. Other [Ask to specify]
88. (Don't know)
99. (Refused)

F2. Do residents at your property own or rent their homes?

1. Own
2. Rent
7. Other [Ask to specify]
88. (Don't know)
99. (Refused)

F3. Are units at this property offered at market rental rates or government subsidized housing?

1. Market rate
2. Government subsidized
3. Both market rate and government subsidized
88. (Don't know)
99. (Refused)

F4. How many apartments are at the property that received energy efficient equipment?
0. [Record response]
88. (Don't know)
99. (Refused)

F5. How many multifamily complexes does your company own or manage?
0. [Record response]
88. (Don't know)
99. (Refused)

F6. [IF F5>1] And approximately how many individual apartments or dwellings does that represent?
0. [Record response]
88. (Don't know)
99. (Refused)

F7. [IF F5>1] Have some of your other properties participated in MCE energy efficiency programs?
1. Yes
2. No
88. (Don't know)
99. (Refused)

F8. [IF F7=1] What other programs have these properties participated in? [OPEN END]
0. [Record response]
88. (Don't know)
99. (Refused)

F9. [IF F7=2] Why have your other properties not participated in MCE's energy efficiency programs?
0. [Record response]
88. (Don't know)
99. (Refused)

F10. What year was the property built?
0. [Record response]
88. (Don't know)
99. (Refused)

Closing

[READ FOR ALL]

CL1. Thank you for all your responses. Should we have any follow up questions, would it be okay to contact you again?

1. [*If yes, ask*] What is the best way to reach you? [Record response]

2. No

Those are all the questions we have. On behalf of the California Public Utilities Commission, thank you for taking the time to complete this survey.

[END]

For more information, please contact:

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