




2017 NONRESIDENTIAL ESPI DEEMED LIGHTING IMPACT EVALUATION

Final Report

Submitted to:
California Public Utilities Commission

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1 EXECUTIVE SUMMARY

1.1 NEED FOR STUDY

This study evaluates a subset of lighting technologies with high levels of uncertainty regarding the potential energy savings and were offered by the 2017 investor-owned utility (IOU) energy efficiency programs. The study then develops revised savings estimates to inform CPUC regulatory requirements and to determine if the program achieved the savings goals for the state. The specific lighting technologies studied, the general approach to developing savings, the resulting evaluated savings values and recommendations are discussed below.

1.2 ENERGY EFFICIENCY TECHNOLOGIES STUDIED

This evaluation focused on four lighting technologies:

- Indoor LED Fixture - These are typically 4-foot lighting fixtures found in a garage.
- Outdoor LED Fixture – These are the lights found outdoors, like in parking lots and parking garages.
- Indoor LED Light Bulbs – These are the classic light bulbs you would find in a desk lamp.
- Indoor LED Reflector Light Bulbs - These are often referred to as “flood lights.”

The IOUs offered these four technologies through their commercial rebate programs. The technologies studied represent roughly 8.9% of the total kWh energy savings reported by all IOU program technologies statewide (SW), over the life of the technologies – referred to as lifecycle savings. Table 1-1 presents the distribution of reported kWh energy savings across the four studied technologies for each IOU along with the SW total.

TABLE 1-1: PERCENTAGE OF 2017 REPORTED GROSS KWH SAVINGS BY PORTFOLIO AND LIGHTING TECHNOLOGY

2017 Lighting Technology	Percent of Portfolio Lifecycle kWh Savings				Percent of Lifecycle kWh Savings Among All Lighting Technologies			
	Statewide	PG&E	SCE	SDG&E	Statewide	PG&E	SCE	SDG&E
Indoor LED Fixture	**4.0%**	5.9%	3.5%	1.8%	**45.7%**	42.5%	49.9%	52.9%
Outdoor LED Fixture	**3.0%**	5.1%	2.4%	0.3%	**33.5%**	36.5%	33.8%	9.4%
Indoor LED Light bulbs	**0.8%**	1.3%	0.5%	0.6%	**9.3%**	9.7%	6.7%	17.7%
Indoor LED Reflector Light bulbs	**1.0%**	1.6%	0.7%	0.7%	**11.5%**	11.3%	9.6%	20.0%
TOTAL	**8.9%**	**13.9%**	**7.1%**	**3.4%**				

While these technologies represented 8.9% of claimed lifecycle kWh savings at the statewide level, the distribution of savings varies within each IOU. Overall, indoor LED fixtures represent the most significant savings across technologies at the statewide level (45.7%), followed by outdoor LED fixtures (33.5%) and LED light bulb and reflector light bulb technologies (9.3% and 11.5%, respectively).

1.3 APPROACH

The study's objective is to evaluate IOU savings claims for the four lighting technologies and to conduct research that develops revised estimates of savings. This study examines each of the parameters that make up the energy (kWh) and demand (kW) savings provided over the lifetime of these technologies:

- Installed measure counts – the quantity of rebated units that were installed and operable.
- Annual hours of use (HOU) – the amount of time throughout the year the technologies are "ON".
- The change in power measured in watts, referred to as "Delta wattage"- this represents the efficiency of the installed measure relative to the pre-existing equipment.
- Effective useful life (EUL) – this is how long the energy efficient equipment will operate into the future. This is critical to estimating lifecycle savings.

Various techniques were used to study each parameter. For some technologies, customers were visited on site to collect information to support the energy savings calculations. In some instances, monitoring equipment was installed on the new lighting systems to measure the number of hours the lights are "ON." Another key on-site activity collected information on the model numbers of the light bulbs or fixtures installed so that wattage values and the efficacy of the equipment could be determined from manufacturer specifications.

The evaluation compares the savings reported by the programs for each parameter to evaluation results developed using the data collected on site. The ratio of the evaluated savings to reported savings is referred to as the "realization rate" or the rate at which reported savings are realized through the evaluation.

The evaluation also examines how successful the IOU programs were in influencing customers to install energy efficient technologies that would not have been installed if the programs had not existed. Customers who would have installed the same energy efficient equipment in the absence of the program are referred to as "free riders," because they receive incentives from the programs for actions they would have undertaken without the program's existence. The evaluation examines both the total amount of savings derived among all participants, referred to as "gross savings," and the savings that is generated "net" of free riders, referred to as "net savings." The ratio between the net and gross levels of savings is referred to as the net-to-gross ratio. To estimate the net-to-gross ratio, a representative sample of participants are telephone surveyed and asked several questions regarding the program's influence on their decision to install the energy efficient equipment. The survey examines various factors related to the program and examines what the customer would likely have done in the absence of the program. The net-to-gross ratio is a value between zero and 100%, where the higher the ratio the better, meaning the program had a higher influence on the installation of that energy efficient technology.

The commercial lighting population is comprised of a variety of rebated LED fixture technologies. These rebated technologies are delivered to participating customers through different program types. "Downstream" programs offer rebates directly to the end-use customers. "Midstream" programs provide rebates directly to distributors, who them offer discounted energy efficiency equipment to contractors. The participating distributor signs an agreement with the IOU, and they provide point of purchase incentives to customers, who are typically contractors. The distributor may notify the customer that they are receiving an incentive on behalf of the program, but the distributor submits the required information to the IOU for payment and verification.

The key objective of this evaluation is to estimate evaluated net lifecycle energy and demand savings. This value is the savings estimated by the evaluation, over the life of the technologies, minus (net) the free riders.

The following table presents which technologies had on-site and telephone surveys performed, and whether evaluated gross and net savings values were calculated or passed through, meaning reported values were used.

TABLE 1-2: DATA COLLECTION AND ANALYSES CONDUCTED BY TECHNOLOGY

2017 Lighting Technology	Measure Type	Data Source		Evaluation Update	
		New Phone Surveys	Existing On-sites	NTG	Gross
Indoor LED Fixture	Downlight		X	Pass Through	X
	High Bay	X		X	Pass Through
	Non-High Bay	X		X	Pass Through
Indoor LED light bulbs	A-Lamp light bulbs		X	Pass Through	X
	Reflector light bulbs		X	Pass Through	X
	Specialty light bulbs			Pass Through	Pass Through
Outdoor LED Fixtures	Non-Street Light	X		X	Pass Through

1.4 RESULTS

The results of this evaluation are provided in Table 1-3 through Table 1-5 below. Shown for each technology are the evaluated and reported net lifecycle savings values (MWh), the realization rates and the corresponding net-to-gross ratio for downstream technologies where new phone surveys were conducted.

TABLE 1-3: PG&E LIFECYCLE NET MWH REALIZATION RATES FOR EVALUATED TECHNOLOGIES

2017 Lighting Technology	Lighting Type	Life Cycle Net MWh Savings			Net-to-Gross Ratio (Evaluated)
		Reported	Evaluated	Net Realization Rate (Evaluated/ Reported)	
LED Fixture	Downlight	10,124	17,624	174%	
	High/Non-High bay	235,638	150,014	64%	0.39
LED light bulb	A-Lamp light bulb	52,737	33,788	64%	
	Specialty light bulb	3,002	3,002	100%	
LED Reflector light bulb	MR-16	4,818	6,042	125%	
	Reflectors	65,175	52,355	80%	
Outdoor LED Fixture	Non-Street Light	199,323	158,280	79%	0.47

TABLE 1-4: SCE LIFECYCLE NET MWH REALIZATION RATES FOR EVALUATED TECHNOLOGIES

2017 Lighting Technology	Lighting Type	Life Cycle Net MWh Savings			Net-to-Gross Ratio (Evaluated)
		Reported	Evaluated	Net Realization Rate (Evaluated/ Reported)	
LED Fixture	Downlight	3,644	4,646	128%	
	High/Non-High bay	16,844	19,444	115%	0.79
LED light bulb	A-Lamp light bulbs	20,713	17,354	84%	
	Specialty light bulbs	4,366	4,366	100%	
LED Reflector light bulb	MR-16	3,943	5,155	131%	
	Reflectors	34,241	31,392	92%	
Outdoor LED Fixture	Non-Street Light	121,661	96,396	79%	0.55

TABLE 1-5: SDG&E LIFECYCLE NET MWH REALIZATION RATES FOR EVALUATED TECHNOLOGIES

2017 ESPI Measure	Measure Type	Life Cycle Net MWh Savings			Net-to-Gross Ratio (Evaluated)
		Reported	Evaluated	Net Realization Rate (Evaluated/ Reported)	
LED Fixture	Downlight	2,631	1,997	76%	
	High/Non-High bay	31,073	30,147	97%	0.64
LED light bulbs	A-Lamp light bulbs	10,112	8,824	87%	
	Specialty light bulbs	4,590	4,590	100%	
LED Reflector light bulbs	MR-16	1,688	2,154	128%	
	Reflectors	15,782	13,457	85%	
Outdoor LED Fixture	Non-Street Light	6,629	8,730	132%	0.81

The realization rates, which essentially compare the evaluated and reported savings values, vary significantly across each technology and program administrator. Differences between the evaluated and reported savings values are due to differences in the underlying parameters that comprise the energy and demand savings.

For LED light bulbs and downlighting (light bulbs that are downward facing, usually in a recessed can in the ceiling), realization rates vary considerably by technology. These variations are primarily driven by the following:

- The evaluation team estimated different hours of operation than assumed by the reported savings values (Section 5).
- The reported savings assumed the light bulbs being replaced were more inefficient than what was found by the evaluation team. This led to a reduction in the amount to energy savings (Section 5).
- The evaluation team found the lighting technologies were installed and operating properly and thus did not have to make significant adjustments based on improper installations (Section 6).
- The evaluation team's findings suggest that LED lamp technologies are becoming more efficient – they can deliver the same light output (measured in lumens) per unit of power (measured in watts). (Section 6).

1.5 RECOMMENDATIONS

- **Future evaluation efforts should consider conducting a large-scale monitoring study for technologies like LED downlights and reflector lamps installed in high usage areas.** The annual operation of these technologies can have potentially significant impacts on realized energy and demand savings moving forward. This evaluation found operating hours for LED downlight technologies – in particular – were dramatically different than reported claims. Downlight kits were generally installed in high usage areas like lobbies and hallways that can operate at or near 24 hours a day, seven days a week.
- **Further research should be conducted to continue to track the typical baseline and efficiency of equipment replaced with program-rebated LED indoor and outdoor technologies.** Our field work revealed some program participants report replacing inefficient technologies, such as metal halide, mercury vapor, and high-pressure sodium lights, with outdoor LED fixture technologies.
- **All workpaper documentation (documents, workbook calculations and supporting documents) should be posted on the CPUC's Workpaper archive website.** Not all documentation could be found detailing the specific parameters comprised of the ex ante claimed savings values. This caused unnecessary coordination with the PAs to find the missing workpapers.

1.6 CONTACT INFORMATION

The ED Project Manager for this study was Ms. Abhilasha Wadhwa. Mr. Brian McAuley of Itron, Inc. served as the manager of the impact evaluation.

TABLE 1-6: CONTACT INFORMATION

Firm	Lead	Contact Info
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2 INTRODUCTION AND OVERVIEW OF STUDY

This report documents the activities and results of the 2017 Nonresidential Deemed Lighting Impact Evaluation of the California Investor Owned Utilities (IOU) energy efficiency programs. The overall goal of this study is to perform an impact evaluation on specific nonresidential deemed lighting measures that were identified in the Efficiency Savings and Performance Incentive[1] (ESPI) decision for program year (PY) 2017. The ESPI mechanism was adopted on September 5, 2013 in D.13-09-023 and provides monetary incentives to IOUs for performance in resource and non-resource program activities.

This evaluation focuses on energy efficiency (EE) resource program savings – measured in net ex post lifecycle energy and demand savings – realized by IOU programs in PY2017. The evaluation team collected and analyzed primary data from PY2017 and existing data from 2013-2015 to develop net ex post lifecycle savings and to satisfy impact evaluation requirements for lighting measures on the PY2017 Uncertain List. This report details the goals and objectives of the impact evaluation to meet those requirements. Likewise, the report discusses the researchable issues, information on the measure groups evaluated as well as the data sources used, the approach for sampling, the verification analysis and the methods used to determine ex post net lifecycle energy impacts. Finally, the report presents the results and findings from the analysis that can then be used to update the Net-to-Gross Ratios (NTGRs) and gross/net first year and lifecycle savings for the measures detailed in the ESPI decision.

2.1 ANALYSIS OF MEASURE UNCERTAINTY

The objective of this study is to perform a measure or measure-parameter impact evaluation – utilizing existing evaluation data and new primary evaluation data – to update ex ante gross or net savings estimates and inform future savings values for lighting measures identified in the PY2017 ESPI decision. Attachment A of the ESPI decision provides an overview of the measure groups (i.e., Food Service equipment, Indoor LED Fixtures), the energy resource (i.e., electric, gas) and the parameters that have been identified as potentially requiring ex post verification. These parameters include installation/verification rates, Unit Energy Savings (UES), NTGRs, gross and net energy savings values, effective useful life (EUL) and impact load shapes. The measure groups and parameters detailed in Attachment A were selected for ex post verification based on several criteria:

- Ex ante savings for the measure are substantially uncertain
- Ex ante savings for the measure represent a significant proportion of program administrator (PA) portfolio savings
- Ex ante savings claims for the measure are expected to increase substantially

[1] http://www.cpuc.ca.gov/general.aspx?id=4137

The final 2017 ESPI Uncertain List identifies several portfolio lighting measures that are subject to some level of ex post evaluation for PY2017. Below is a list of the lighting measure groups identified in that decision. Note that the parameters associated with these measures represent potential areas of focus and that the ex post evaluation is not limited in scope to any specific parameters. The evaluation team has determined which measures and measure-parameters are subject to ex post evaluation. This determination is based on several factors, which will be detailed throughout this report.

Table 2-1 below summarizes the source of uncertainty surrounding the claimed energy and demand impacts for each measure and details which parameters were studied for ex post evaluation. All but non-downlight indoor LED fixture measures were included on the PY2015 uncertain list. Furthermore, all measures listed below will remain on the PY2018 list. The remainder of the report discusses these parameters and how they were studied, in more detail.

TABLE 2-1: OVERVIEW OF PY2017-2018 MEASURE UNCERTAINTY

2017-2018 ESPI Measure	Measure Type	% of PY2017 Portfolio LC KWh Savings (SW)	2015 ESPI Measure	2017 Uncertain Parameters	Uncertain Parameters Studied in 2017
Indoor LED Fixture	Downlight	4.0%	X	Installation Rates, UES, NTG ratio, EUL	Installation Rates, UES, EUL
	High/Non-Highbay				NTG Ratio
LED Lamp	A-Lamps	0.8%	X	GRR, NTG ratios	GRR (using a UES approach and installation rate, EUL)
	Specialty Lamps		X		-
LED Reflector Lamp	MR-16	1.0%	X	GRR, NTG ratios	GRR (using a UES approach and installation rate, EUL)
	Reflectors		X		
Outdoor LED Fixture	Non-Street Light	3.0%	X	Installation Rates, UES, NTG ratio, EUL	NTG Ratio

As evident above, LED fixture measures represent a significant proportion of portfolio level lifecycle savings at the statewide level (Table 2-2 also provides that proportion for each PA). Furthermore, measures like high and non-highbay lighting were not on the 2015 ESPI Uncertain List and measures like outdoor LED fixtures were not evaluated with a high level of rigor in PY2015. Since these measures

comprise a significant percentage of ex ante claimed savings (both in PY2017 and PY2018) along with the fact that little or no ex post impact evaluation results exist, they continue to appear on the uncertain list.

For indoor lamp and downlights, they too represent a significant proportion of portfolio level lifecycle savings at the statewide level. As discussed further throughout this report, these measures were evaluated extensively in PY2013-2015. However, the NTG ratios were developed from potentially very different participant populations and program delivery channels (i.e., downstream versus midstream) than in PY2017 or PY2018. Likewise, the UES estimates, EULs and GRRs are all impacted by the underlying parameters that constitute the claimed savings – operating hours, delta wattages, installation rates, etc.

Changes in the composition of the underlying program participant population can have a significant effect on the realized savings claims for these measures across program years. For example, program participants installing LED A-lamp measures in PY2013 may have been replacing more inefficient baseline technologies (like general service incandescent halogens) compared to program participants installing the same measures in 2015 (These participants may have replaced more CFL technologies, which are less efficient than an equivalent LED, but more efficient than a halogen). Furthermore, a program participant in PY2018 may be replacing a less efficient earlier generation LED lamp with a more efficient LED technology. While these measures represent a significant percentage of PA portfolio level savings and the baseline composition of the measure continues to evolve and remain uncertain, claimed impacts for these measures will remain uncertain and ex post evaluation will be required to true up claimed savings.

2.2 RESEARCH OBJECTIVES

Rather than develop a full, comprehensive analysis on all uncertain measures, this evaluation focuses on evaluating specific parameters within the savings algorithms for some measures while implementing a more comprehensive analysis on others. Several research objectives have been targeted in order to develop net and gross ex post impacts for the measures detailed above. The following tasks have been performed, either by leveraging existing data from past evaluation efforts or collecting new primary data from participant phone surveys to develop ex post net lifecycle savings. A more detailed description of the impact methodologies follows in Section 5, but the tasks are summarized below:

- Confirm installations (verification). This includes on-site verification of measure installations that represent a significant percentage of ex ante claimed savings.
- Estimate baseline (both pre-retrofit and code based) and replacement (post-retrofit) equipment wattages, operating hours and use shapes to support the estimate of gross ex post impacts and 8,760 impact load shapes.
- Estimate participant free-ridership to support the development of net-to-gross ratios and net savings values.

- Update EUL estimates based on ex post operating hours.
- Estimate first year and lifecycle gross and net ex post impacts (kWh, kW).
- Develop gross and net realization rates (GRRs and NRRs) based on unit energy savings (UES) and NTG ratios – both first year and lifecycle.

2.3 STUDIED MEASURE GROUPS

Table 2-2 presents the deemed lighting measure group contribution to each PA's 2017 portfolio lifecycle gross ex ante energy savings (as well as the statewide contribution). Also shown are each measure's lifecycle gross energy savings as a percentage of all ESPI nonresidential lighting measure savings.

TABLE 2-2: PERCENTAGE OF 2017 EX ANTE GROSS KWH SAVINGS BY PORTFOLIO AND DEEMED ESPI LIGHTING

2017 ESPI Uncertain Measure	Percent of Portfolio Lifecycle kWh Savings				Percent of Lifecycle kWh Savings among All Deemed ESPI Lighting Measures			
	SW	PG&E	SCE	SDG&E	SW	PG&E	SCE	SDG&E
Indoor LED Fixture	**4.0%**	5.9%	3.5%	1.8%	**45.7%**	42.5%	49.9%	52.9%
Outdoor LED Fixture	**3.0%**	5.1%	2.4%	0.3%	**33.5%**	36.5%	33.8%	9.4%
Indoor LED Lamps	**0.8%**	1.3%	0.5%	0.6%	**9.3%**	9.7%	6.7%	17.7%
Indoor LED Reflector Lamps	**1.0%**	1.6%	0.7%	0.7%	**11.5%**	11.3%	9.6%	20.0%
TOTAL	**8.9%**	**13.9%**	**7.1%**	**3.4%**				

As shown in Table 2-2, each of these uncertain measures contributes varying levels of ex ante lifecycle gross portfolio savings. Overall, they represent roughly 8.9% of total ex ante kWh savings at the statewide level. LED indoor and outdoor fixtures represent roughly 46% and 34% of that total, respectively. LED lamp measures represent the remaining 20%, at the statewide level.

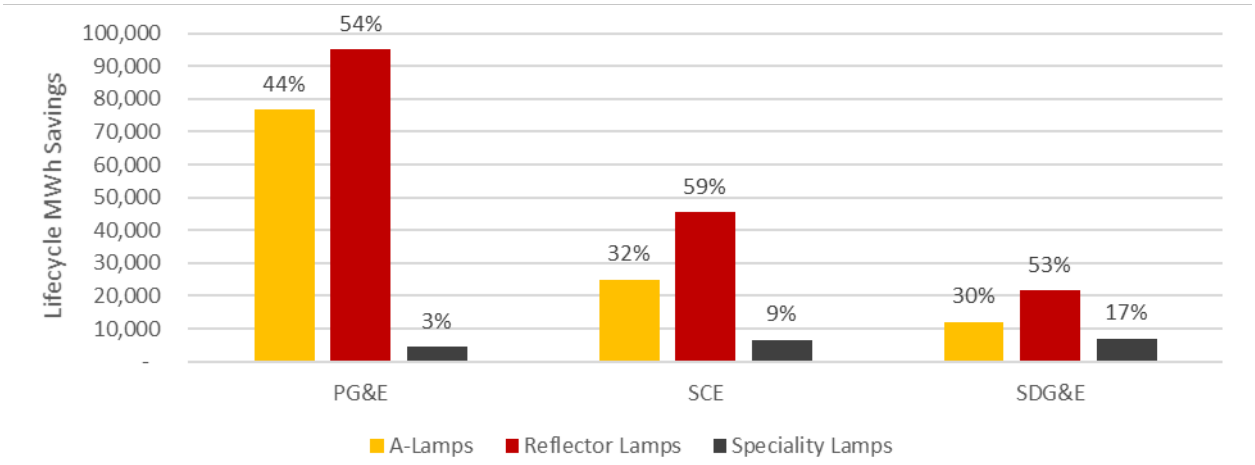
The measure groups listed on the ESPI Uncertain List for 2017 are aggregate measures that are comprised of four deemed measure groups and well over 500 measure names.[2] The evaluation team mapped each of the measure names that were represented in the tracking data to these deemed ESPI measure groups. The evaluation team also referenced work papers for some measures where the measure name was too generalized, to more accurately map it to a specific measure category.

[2] Appendix E provides a detailed mapping of how each ESPI measure was mapped to a specific measure name found in the 2017 program tracking data.

2.3.1 Indoor LED Lamps

The ex post analysis for deemed lighting measures has been conducted at different levels of aggregation and not all ESPI measures have been targeted for the evaluation. As presented above in Table 2-2, LED lamp and reflector lamp measures represent roughly 1.8% of statewide lifecycle portfolio energy savings and 20% of the statewide kWh savings for all the deemed ESPI lighting measures. This measure category, however, represents several different technology types and applications. Indoor LED lamps, for example, include the A-lamp type, reflector lamp types (BR, MR-16 and PAR) and specialty bulbs like candelabras and accent globes. Figure 2-1 presents the distribution of lifecycle MWh savings for each technology type for each PA.

FIGURE 2-1: DISTRIBUTION OF LIFECYCLE MWH SAVINGS FOR INDOOR LED LAMPS BY PA



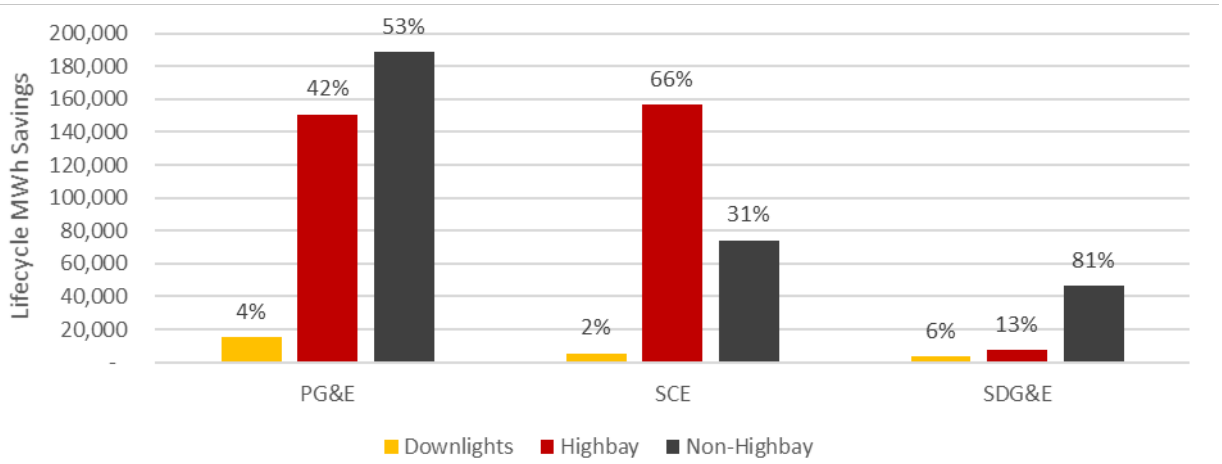
LED reflector lamps represent the most significant percentage of claimed lifecycle MWh savings for each PA, followed by LED A-lamps and specialty bulbs. The evaluation team conducted extensive primary data collection research in 2013-2015 for A-lamp and reflector lamp measures but did not conduct any research on specialty bulbs like candelabras and globes. Much like PY2017, these measures represented a much smaller contribution to portfolio level savings compared to the other technology types.

2.3.2 Indoor LED Fixtures

As presented in Table 2-2, LED indoor fixture measures represent roughly 4.0% of statewide lifecycle portfolio energy savings and 46% of the statewide kWh savings for all the deemed ESPI lighting measures. The indoor LED fixture measure group also represents several different technology types and applications. LED downlights are represented in the LED fixture measure group because they include not only a lamp replacement, but a fixture/housing replacement as well. The evaluation team conducted extensive

primary data collection research in 2015 for these measures and found demonstratively different applications and ex post savings values for these measures compared to lamp replacement measures. Non-downlight fixtures can also be installed in a high-bay application or in a low-bay setting. These measures range in light output and baseline/measure case wattages and have different applications and technology considerations – troffers, panel fixtures, integrated retrofit kits, T-LEDs, etc. These measures have not been previously evaluated in past impact evaluations. Figure 2-2 presents the distribution of lifecycle MWh savings for each indoor application for each PA.

FIGURE 2-2: DISTRIBUTION OF LIFECYCLE MWH SAVINGS FOR INDOOR LED FIXTURES BY PA

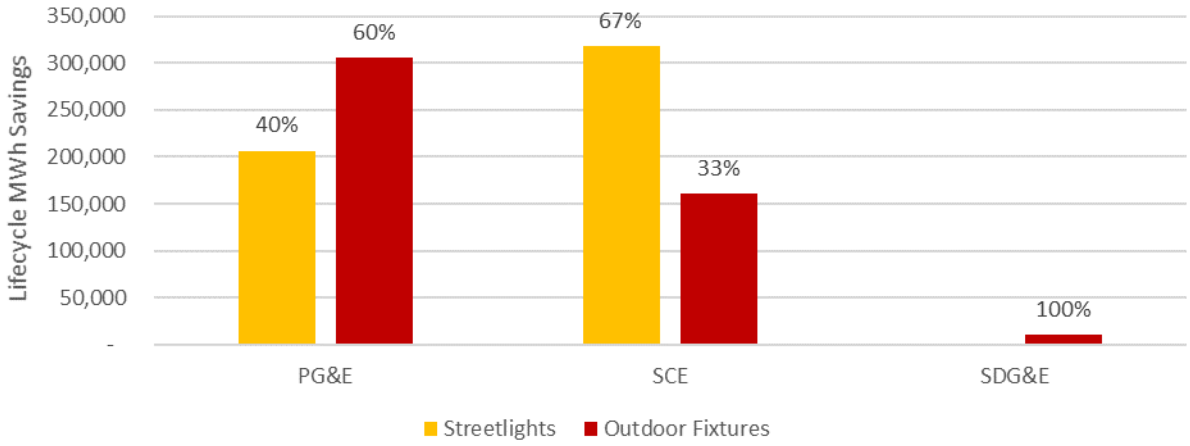


There is significant heterogeneity in the technology types representing high-bay and low-bay measures. Some measures are whole fixture replacements with different baseline considerations (i.e., 6L high light output (HLO) T8 systems versus pulse start metal halide (PSMH) or high-pressure sodium (HPS)). Some measures are specifically detailed as high-bay lighting in the program tracking data, while others don't have that application designation. Overall, however, these measures represent the most significant percentage of claimed lifecycle MWh savings for each PA. Downlighting represents the remaining claimed savings.

2.3.3 Outdoor LED Fixtures

As presented in Table 2-2, LED outdoor fixture measures represent roughly 3.0% of statewide lifecycle portfolio energy savings and 34% of the statewide kWh savings for all the deemed ESPI lighting measures. For exterior LED fixtures, streetlights serve a much different purpose than parking lots or walkway lighting. Streetlights, however, are not on the 2017 ESPI uncertainty list, but their lifecycle energy savings contribution (by PA) is presented alongside other outdoor LED measures in Figure 2-3 for comparative purposes.

FIGURE 2-3: DISTRIBUTION OF LIFECYCLE MWH SAVINGS FOR OUTDOOR LED FIXTURES BY PA



2.4 OVERVIEW OF IMPACT EVALUATION METHODOLOGY

The evaluation team estimated ex post gross UES savings values by developing hourly impacts and impact load profiles. These profiles were then aggregated to develop an annual ex post gross energy savings value (kWh) or, averaged over specific coincident peak hours, to develop ex post gross demand savings (kW). The evaluation team then compared those UES impacts to the ex ante impacts claimed in the program tracking data to develop a ratio of ex post to ex ante gross savings.

The general approach the evaluation team utilized to estimate ex post gross impacts is based on developing hourly impacts to generate an impact load profile:

$$\text{Impact\_Hour\_i} = \begin{bmatrix}(\text{Baseline\_Wattage} \times \text{Percent\_On\_Pre\_Hour\_i}) \\ -(\text{Post\_Wattage} \times \text{Percent\_On\_Post\_Hour\_i})\end{bmatrix}$$

The hourly (i) impacts for each measure were aggregated to develop an annual or 8,760 load shape and summed to develop ex post gross kWh (energy) savings estimates. These hourly impacts were also averaged across specific hours to develop an ex post gross kW (demand) savings estimate. A more detailed discussion of the impact evaluation methodology can be found in Section 5.

A net-to-gross (NTG) analysis was also performed using a self-report analysis based on participant phone survey data. NTGRs were applied back to the ex ante gross impacts in order to estimate net savings for the population of program participants. The approach for estimating NTGRs for these customers uses a standardized Self-Report Approach (SRA)[3] that is based on the results of self-report telephone surveys with program participants. The evaluation team utilized this standard SRA framework with relatively minor modifications to NTG survey question batteries, and revisions to the NTG scoring algorithm based on specific recommendations from the 2013-2015 Program Performance Assessment of the Nonresidential Downstream Programs.[4]

The SRA methodology used in this study 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 that were assigned weights. Respondents were asked 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 the real-world decision making and helped to ensure that all non-program influences are accounted for when assessing the unique contribution of the program to the implementation of the energy efficiency project. A more detailed discussion of the NTG methodology can be found in Section 6.

[3] This SRA framework was originally developed by the statewide Nonresidential NTG working group during 2008.

[4] https://pda.energydataweb.com/api/view/1975/2013-2015%20Program%20Performance%20Assessment%20Of%20The%20Nonresidential%20Downstream%20Programs%20-%20Final.pdf

The remainder of this report will include the following:

- Section 3 discusses the data sources that were utilized to estimate each of the individual measure parameters.
- Section 4 discusses the sample design for measures subject to ex post evaluation.
- Section 5 discusses the development of each of the gross impact parameters – installation rates, pre-and post-retrofit wattages, operating hours and effective useful life (EUL), along with the ex ante to ex post parameter comparisons.
- Section 6 discusses the results of the phone interviews and the net-to-gross (NTG) analysis.
- Section 7 presents the final study results including a discussion of the gross and net realization rates and the total population level ex post energy and demand savings.
- Section 8 presents the conclusions and recommendations.
- Appendix AA presents the standardized high-level savings for both gross and net first year and lifecycle.
- Appendix AB presents the standardized per unit savings for both gross and net first year and lifecycle.
- Appendix AC presents the summary of recommendations for the Response to Recommendations (RTR).
- Appendix A presents the participant telephone survey instrument.
- Appendix B presents the on-site survey instrument.
- Appendix C presents the method used to adjust the self-reported operating schedules.
- Appendix D presents the phone survey banners.
- Appendix E presents the ESPI measure mapping from measure name in the tracking data.
- Appendix F presents the evaluators responses to public comment.

3 DATA SOURCES

The evaluation team utilized a variety of data sources to support the development of each impact parameter and update UES values, installation rates and NTGRs for the ESPI uncertain measures in this study. These data sources were leveraged from past impact evaluation activities as well as from new primary data collection. Table 3-1 presents the data sources and ex post impact evaluation updates for each of the measures discussed in Section 2.

TABLE 3-1: DATA SOURCES AND EX POST UPDATE FOR PY2017 ESPI MEASURES

2017 ESPI Measure	Measure Type	Data Source		Ex Post Update	
		New Phone Surveys	Existing On-sites	NTG	Gross
Indoor LED Fixture	Downlight		X	Pass Through	X
	High Bay	X		X	Pass Through
	Non-High Bay	X		X	Pass Through
Indoor LED Lamps	A-Lamps		X	Pass Through	X
	Reflector Lamps		X	Pass Through	X
	Specialty Lamps			Pass Through	Pass Through
Outdoor LED Fixtures	Non-Street Light	X		X	Pass Through

Throughout this report, the evaluation team has identified which sources of data were leveraged for each measure-parameter – both for the gross and the net impact analysis. Below is a brief description of each data source along with the evaluation year that corresponds with the data collection:

- **2013** – the data for this year represents program rebated LED technologies evaluated throughout the PY2010-2012 program years and early Q1-Q2 PY2013 data.[1] Most program measures in this evaluation were rebated in Q3-Q4 of 2012 and Q1-Q2 of 2013.
- **2014** – the data for this year represents program rebated LED technologies evaluated throughout the entirety of PY2013[2] and PY2014,[3] excluding measures from Q1-Q2 of PY2013 that were subject to review in the previous evaluation.
- **2015** – the data for this year represents program rebated LED technologies evaluated throughout the entirety of PY2015.[4]

[1] http://www.calmac.org/ (Calmac ID: CPU0101.01)

[2] http://www.calmac.org/ (Calmac ID: CPU0140.01)

[3] http://www.calmac.org/ (Calmac ID: CPU0139.01)

[4] http://www.calmac.org/ (Calmac ID: CPU0167.01)

The evaluation team has utilized existing on-site primary research from 2013-2015 to update gross impacts for three measure types – downlighting, reflector lamps and A-Lamps. The evaluation team also conducted NTG analyses on these measures throughout those program years. However, given underlying changes in program delivery and the unique nature of self-reported program attribution, these estimates will not be used to update ex ante NTG estimates for PY2017 participants. The evaluation team has not performed new primary data collection for these measures by way of self-report phone surveys, so ex ante claimed NTG ratios for these measures will be "passed through".

The evaluation team has no existing primary data for LED fixture measures – indoor high/non-highbay and outdoor fixtures – and the claimed savings for these measures have increased substantially over of the past few program years. Given budgetary considerations and accelerated reporting timelines, no new on-site primary research was conducted for these measures. Ex ante claimed gross savings will be "passed through" for PY2017 program participants. However, self-report phone surveys were conducted for these measures to update NTG estimates.[5]

Specialty lamps like globes and candelabras will not receive a gross *or* net ex post update. The evaluation team has no existing primary on-site data for specialty bulbs, but they will be evaluated for the PY2018 evaluation.

3.1 PROGRAM TRACKING DATA

Prior to the commencement of the data collection and sample planning, the evaluation team reviewed the program tracking data for PY2017 participants. These data were uploaded by each of the IOUs to a centralized server. The evaluation team analyzed, cleaned, re-categorized, reformatted and merged these separate datasets into one program tracking database. We reviewed the measure groups within that database that were identified on the 2017 ESPI uncertain list to gain insight into the number of program participants receiving rebates for PY2017 and the ex ante savings claims associated with those measure installations. These data informed the data summaries presented in Section 2 along with the sampling plan (Section 4) for ex post evaluation.

3.2 EXISTING ON-SITE VERIFICATION AUDITS

The evaluation team conducted on-site audits for LED A-lamp, reflector lamp and downlighting measures in 2013-2015. The purpose of these audits was to collect site-specific information that could be used to support the parameter estimates that are used in the impact algorithm. On-site surveyors

[5] The evaluation team has also utilized the phone surveys as a recruitment tool for on-site verification. These on-sites will be conducted in CY2019 and will be used as an input for new primary gross research for PY2018.

verified if measures that were rebated were installed and operable. When rebated quantities were not consistent with the quantities found on site, the surveyors also quantified and detailed the reason for that inconsistency – the number of rebated measures that had been removed, had burned out or had been placed in storage.

Surveyors also collected equipment manufacturer and model numbers so that the evaluation team could perform equipment lookups. These lookups provided information regarding the wattage and light output of the installed equipment to support the development of post-retrofit wattages. Surveyors also attempted to collect information on the baseline equipment that had been replaced. They investigated non-rebated areas and/or storage areas to determine the wattage of the pre-existing equipment. The evaluation team also installed monitoring equipment to develop time-of-use data and annual operating hours. Finally, self-report data were collected on lighting equipment usage schedules and business hours – in combination with the actual metered data – to aid in the development of pre- and post-retrofit load shapes.

3.2.1 Existing On-site Data Used to Support Pre- and Post-Retrofit Wattages

The evaluation team collected detailed information regarding the rebated measures found on site. This information included a full inventory of the fixture/lamp type, the nominal lamp wattage, ballast information and fixture configurations. The evaluation team also collected lamp/fixture manufacturer and model numbers and performed lookups – based on measure specification sheets – to develop post-retrofit input fixture/lamp wattages and to collect the efficacy of the program rebated measures. Table 3-2 presents the data collection summaries from the 2014-2015[6] on-site verification work conducted by the evaluation team. The total unique site-measures found on site are presented for each make and model lookup performed for each binned rebated measure (i.e., 4-9W, 10-15W and >15W). Also presented is the count of baseline equipment reported on site by either the site contact or the auditor at the time of the inspection and the count of baseline equipment used in the wattage analysis.[7]

[6] The wattage data collected as part of the 2013 impact evaluation was not used in the wattage analysis.

[7] Section 5 details how these data were used in the analysis, but the baseline equipment in the analysis includes only CFL, halogens or other LED technologies *found* on site during the audits.

TABLE 3-2: INDOOR LED POST-RETROFIT MODEL LOOKUPS AND PRE-RETROFIT OBSERVATIONS (2014-2015)

LED Type	Wattage Range	Measure Case	Baseline	
		Make Model Lookups	Baseline Equipment Reported	Baseline Equipment Used
A-Lamp	4-9W	171	143	21
	10-15W	245	222	30
	>15W	10	9	2
	All	**426**	**374**	**53**
Downlight	4-9W	3	2	0
	10-15W	66	63	16
	>15W	10	10	3
	All	**79**	**75**	**19**
MR-16	4-9W	66	63	6
	10-15W	14	13	3
	>15W	1	1	0
	All	**81**	**77**	**9**
Reflectors	4-9W	51	48	5
	10-15W	165	146	21
	>15W	88	73	10
	All	**304**	**267**	**36**

3.2.2 Existing On-site Data Used to Support Pre- and Post-Retrofit Operating Hours

The evaluation team utilized logger data collected throughout the 2013-2014[8] evaluation periods to develop ex post operating hour estimates for indoor LED measures. Those evaluations involved the installation of monitoring equipment on rebated LED measures in a variety of building and area types. These logger data were collected and compared against the self-reported operating schedules that were garnered from the on-site contact as well as against the business hours of the business/facility. The evaluation team analyzed the logger data, self-reported schedules and business hours in variety of ways:

- Actual hourly logger data were compared to hourly self-reported operating schedules during the open hours of the business/facility by day type (weekend vs. weekday).

[8] While the wattage analysis includes primary data collection from 2015, monitoring equipment was not installed in 2015. Self-reporting operating schedules and business hours were collected, however, and were statistically adjusted using logger data from the previous evaluations detailed above.

- Actual hourly logger data were analyzed for each business hour during the week and summarized by business period:
  - Open period: All hours of the day for which the business is open.
  - Opening and Closing Shoulders: The two hours before opening and two hours after closing.
  - Closed Period: All hours for which the business was closed and not in one of the shoulder periods.
- The self-reported comparisons and business hour analysis were also done at the control level – measures controlled by a switch versus measures controlled by an occupancy sensor.

Section 5 and Appendix C discuss the methodology in more detail and discuss how the evaluation team tested the approach. Table 3-3 below presents the number of sites and loggers that were used in the adjustment factor and business hour rate development analysis. These summaries detail the control type of the LED measures being monitored along with the facility and activity area of measure installation.

TABLE 3-3: LOGGED DATA USED FOR ADJUSTMENT FACTORS AND BUSINESS HOUR RATES (2013-2014)

Building Type	Activity Area	Occupancy Sensors		Switch	
		Total Sites	Total Loggers	Total Sites	Total Loggers
Assembly	Classroom			4	5
	Dining			5	7
	Hallway/Lobby			15	21
	Office			5	6
	Other Miscellaneous			12	21
	Religious Worship			9	12
	Restrooms	4	5	12	17
	Storage	1	2	11	13
	Total Assembly	**5**	**7**	**32**	**102**
Lodging	Commercial/Industrial Area			5	5
	Guest Rooms	5	15	23	93
	Hallway/Lobby			11	19
	Other Miscellaneous	3	4	15	23
	Restrooms			5	7
	Total Lodging	**7**	**19**	**39**	**147**
Office – Small	Conference Room			6	6
	Hallway/Lobby			27	32
	Kitchen/Break Room			6	6
	Office			18	21
	Other Miscellaneous	4	5	12	22
	Restrooms	17	18	23	29
	Storage			15	17
	Total Office - Small	**18**	**23**	**61**	**133**
Other	Other Miscellaneous	5	9	11	20
	Total Other	**5**	**9**	**11**	**20**
Restaurant	Dining			50	79
	Hallway/Lobby			16	17
	Kitchen/Break Room			11	11
	Other Miscellaneous	5	8	9	10
	Restrooms	7	9	22	25
	Storage			15	16
	Total Restaurant	**12**	**17**	**86**	**153**
Retail - Large	Other Miscellaneous	2	4	7	11
	Retail Sales			22	33
	Total Retail - Large	**2**	**4**	**24**	**44**
Retail - Small	Hallway/Lobby			5	5
	Kitchen/Break Room			5	5
	Office			6	6
	Other Miscellaneous	3	4	3	3
	Restrooms	21	23	15	16
	Retail Sales			44	79
	Storage			8	10
	Total Retail - Small	**22**	**27**	**65**	**124**
All Building Types		**68**	**110**	**285**	**681**

Overall, measures installed on a switch represent the most significant logger data that were used in the analysis – 681 loggers representing 285 sites. Measures controlled by an occupancy sensor were monitored with 110 loggers installed across 68 sites. Across all building types, controls were more prevalent in restrooms while the distribution of loggers on switches was predicated on the building type and activity area of installation.

As detailed above, the evaluation team utilized existing lighting logger data, adjusted self-report data and business hours from 2013-2014 to develop pre- and post-retrofit hours of use for indoor LED measures *not* monitored throughout 2013-2015. The self-report adjustment factors were developed at the building type, activity area and control level. Table 3-4 presents the number of sites – by building type and activity area – the evaluation team analyzed for each indoor LED technology along with the number of rebated fixtures that were installed and operable at the time of the on-site verification through those program years.

TABLE 3-4: BUILDING TYPE, ACTIVITY AREA AND FIXTURE COUNTS BY INDOOR LED TYPE (2013-2015)

Building Type	Activity Area	A-Lamp		Downlight		MR-16		Reflector	
		Total Sites	Total Fixtures	Total Sites	Total Fixtures	Total Sites	Total Fixtures	Total Sites	Total Fixtures
Assembly	Classroom	7	147						
	Dining	8	141						
	Hallway/Lobby	24	334					9	64
	Kitchen/Breakroom	6	23						
	Office							5	29
	Other Misc	17	640	9	259	8	205	16	645
	Outdoor	12	184	2	63	3	13	7	78
	Religious Worship	20	308	7	301			13	322
	Restroom	23	160						
	Storage	19	79						
	Total Assembly	**46**	**2,016**	**11**	**623**	**10**	**218**	**31**	**1,138**
Lodging	Comm/Ind Work	9	23						
	Dining	9	105					7	153
	Guest Rooms	75	35,037	9	909	5	4,628	13	3,000
	Hallway/Lobby	31	1,489	14	1,484	8	1,520	17	463
	Kitchen/Breakroom	5	99						
	Office	8	55						
	Other Misc	23	479	8	1,288	11	362	10	583
	Outdoor	18	798	1	12	1	47	8	208
	Restroom	14	570						
	Storage	8	68						
	Total Lodging	**86**	**38,721**	**16**	**3,693**	**17**	**6,557**	**29**	**4,408**

Building Type	Activity Area	A-Lamp		Downlight		MR-16		Reflector	
		Total Sites	Total Fixtures	Total Sites	Total Fixtures	Total Sites	Total Fixtures	Total Sites	Total Fixtures
Office-Large	Hallway/Lobby			5	2,158			6	328
	Other Misc			4	1,679			4	98
	Outdoor							3	44
	Total Office-Large			**6**	**3,837**			**7**	**470**
Office-Small	Comm/Ind Work	6	11						
	Dining	5	131						
	Hallway/Lobby	29	255	6	197			27	234
	Kitchen/Breakroom	8	41					6	23
	Office	23	127			8	40	26	231
	Other Misc	12	610	4	75	6	43	13	195
	Outdoor	12	75					10	40
	Patient Rooms	8	550						
	Restroom	79	269					14	73
	Retail Sales							5	42
	Storage	23	93					5	18
	Total Office-Small	**109**	**2,160**	**7**	**272**	**11**	**83**	**65**	**855**
Other	Hallway/Lobby	13	1,026					14	370
	Office	5	41					7	53
	Other Misc	24	2,815	9	155	11	448	7	93
	Outdoor	5	33					15	38
	Restroom	28	143						
	Retail Sales							5	187
	Storage	11	46					5	20
	Total Other	**55**	**4,104**	**9**	**155**	**11**	**448**	**33**	**760**
Restaurant – Fast Food	Dining	21	355			13	77	20	265
	Hallway/Lobby	6	13						
	Kitchen/Breakroom	5	55			7	27	5	38
	Office								
	Other Misc	4	8			2	12	11	104
	Outdoor							6	53
	Restroom	18	39						
	Storage	14	26						
	Total Restaurant – Fast Food	**42**	**496**			**19**	**116**	**32**	**460**

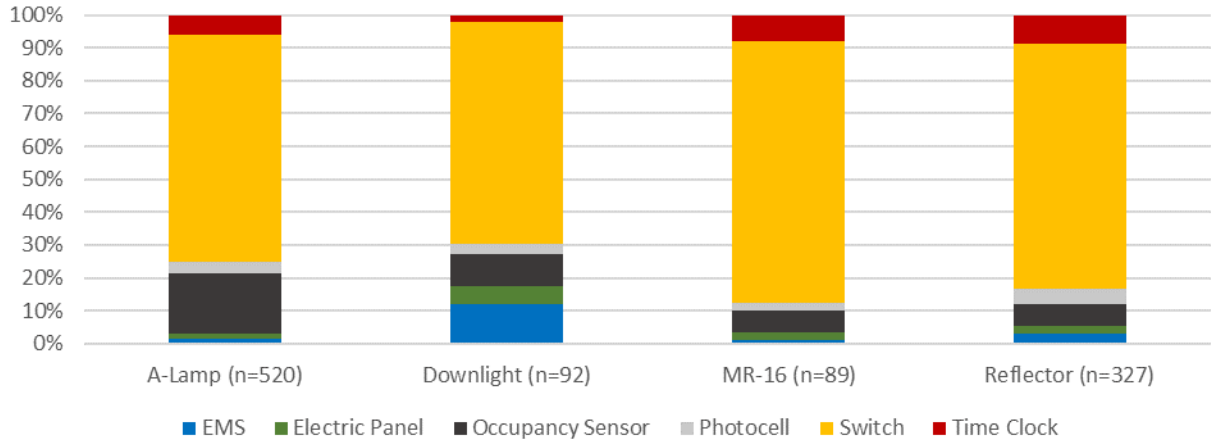
Building Type	Activity Area	A-Lamp		Downlight		MR-16		Reflector	
		Total Sites	Total Fixtures	Total Sites	Total Fixtures	Total Sites	Total Fixtures	Total Sites	Total Fixtures
Restaurant – Sit Down	Dining	47	949	11	291	21	345	43	1,215
	Hallway/Lobby	22	83	8	36			17	82
	Kitchen/Breakroom	20	103					7	34
	Office	6	9						
	Other Misc	6	105	7	39	8	89	7	116
	Outdoor	5	17	1	11	1	5	11	57
	Restroom	43	181					10	47
	Storage	31	54						
	Total Restaurant – Sit Down	**86**	**1,501**	**13**	**378**	**27**	**438**	**54**	**1,551**
Retail-Large	Other Misc	5	169			3	35	9	164
	Outdoor	2	13					2	10
	Retail Sales					11	576	27	13,469
	Total Retail-Large	**6**	**182**			**12**	**611**	**33**	**13,642**
Retail-Small	Hallway/Lobby	17	45					9	41
	Kitchen/Breakroom	7	16						
	Office					6	22	7	36
	Other Misc	15	81	5	24	8	72	14	99
	Outdoor	9	30			2	3	14	69
	Restroom	91	181					6	21
	Retail Sales	25	360	6	65	43	1,102	51	2,631
	Services	6	50	5	134			8	59
	Storage	25	65					6	11
	Total Retail-Small	**122**	**827**	**13**	**223**	**51**	**1,199**	**87**	**2,966**

The activity area and schedule for each installation have a significant impact on the overall operating hours and coincidence demand factors. For example, an LED A-Lamp installed in a guest room of a hotel will generally have lower annual operating hours than an identical lamp installed in the hallway corridors and lobby of the same hotel. Hotel guests are not always in their room, and the room itself may not be occupied consistently throughout the year. Whereas, the hallway lighting is generally operating 24 hours a day regardless of occupancy. The same is true for a measure installed in a restroom compared to the retail sales area of a department store. Overall, the evaluation team verified indoor LED technologies in a variety of business types and activity areas.

The operating hour analysis also included the control type of the post-retrofit equipment. The adjustment factors were developed differently for measures that were installed with an occupancy sensor compared to those that were installed on a switch. Furthermore, rebated measures were also

installed on circuits connected directly to timeclocks, electric panels and energy management systems (EMS). Figure 3-1 presents the distribution of control type associated with each of the rebated measures evaluated throughout 2013-2015.

FIGURE 3-1: DISTRIBUTION OF CONTROL TYPE BY LED TYPE (2013-2015)



3.3 PARTICIPANT PHONE SURVEYS

The evaluation team also conducted phone interviews with participants who had installed program rebated interior LED fixtures (excluding downlights) and outdoor LED fixtures. These surveys detailed building owner and operator responses that supported the NTG analysis and will recruit participants for future on-site verification visits (PY2018).

3.3.1 New Participant Phone Survey

As detailed in Table 3-1, the evaluation team conducted self-reported phone surveys with program participants who installed rebated indoor and outdoor LED fixtures in PY2017. A detailed description of the self-report attribution and NTG analysis can be found in Section 6 and the overall phone survey results are presented in Appendix D but, overall, the surveys were administered to:

- Confirm the measure installation with the program participant
- Identify the facility type and activity area of measure installation
- Identify the equipment that was replaced along with the age and condition of that equipment prior to the retrofit

- Identify if the measure retrofit was natural replacement (NR), replacement on burn-out (ROB) or program accelerated replacement (AR)
- Determine program influence to estimate free-ridership
- Recruit customers for future on-site verification

3.4 IOU WORKPAPERS AND DEER

The evaluation also reviewed the workpapers, the DEER database and any relevant lighting dispositions that impacted the PY2017 measures studied in this evaluation. Furthermore, we conducted a comparative analysis using ex ante parameter estimates from IOU workpapers, data received directly from the IOUs and from data downloaded from DEER. These ex ante estimates were compared against the gross ex post impacts developed using existing primary data collection for each of the measure-parameters to better understand which parameters are driving the gross realization rates for each of the LED lamp, reflector lamp and downlight ESPI measures.

4 SAMPLE DESIGN

This section of the report presents the population of PY2017 nonresidential ESPI measures subject to evaluation and describes the sampling approach the evaluation team utilized to satisfy the impact evaluation objectives detailed in Section 2. The sampling strategy was designed to provide statistically significant impact results for PY2017 program participants while maintaining evaluation delivery timelines and project budgets. The sample design was developed prior to the commencement of data collection activities and was based on several factors:

- Budgetary considerations and accelerated reporting timelines
- Availability of existing primary data
- An understanding of existing primary data limitations
- The magnitude and distribution of ex ante lifecycle energy savings by ESPI measure
- An understanding of the underlying program delivery mechanisms for each ESPI measure
- Sampling requirements needed to develop population-level impacts with a high level of statistical precision

4.1 LED LAMP AND DOWNLIGHT MEASURES

As discussed in Section 2 and 3, the evaluation team utilized both existing and new primary data collection for the ex post evaluation of PY2017 nonresidential deemed ESPI measures. Existing primary data collection served to update gross impacts for indoor LED lamp, reflector lamp and downlight measures. Ex ante net-to-gross ratios from PY2017 have been applied to the ex post gross impact updates to develop net lifecycle savings for these measures. As a result, the evaluation team did not develop a dedicated sampling strategy for these measures. However, for PY2018, new primary research will be conducted for these measures to satisfy the impact evaluation requirements for that program year.[1]

[1] An updated sampling plan for PY2018 ESPI measures will be available in the Spring of 2019, once PY2017 reporting has been completed and program tracking data for PY2018 has been reviewed.

4.2 LED FIXTURE MEASURES

For exterior and interior LED fixtures (excluding downlight measures), the evaluation team conducted phone surveys to:

- Confirm the measure installation with the program participant
- Identify the facility type and activity area of measure installation
- Identify the equipment that was replaced along with the age and condition of that equipment prior to the retrofit
- Identify if the measure retrofit was natural replacement (NR), replacement on burn-out (ROB) or program accelerated replacement (AR)
- Determine program influence to estimate free-ridership
- Recruit customers for future on-site verification

Table 4-1 presents the total number of sites and the distribution of lifecycle MWh savings for each measure by PA. The evaluation team accounted for the number of available site-projects and the magnitude of claimed savings when developing the sample design for LED fixture measures.

TABLE 4-1: PY2017 PORTFOLIO OF EX ANTE MWH SAVINGS FOR NONRESIDENTIAL DEEMED LED FIXTURES

PA	LED Type	Sites	Lifecycle Gross Savings	
		N	MWh	%
PG&E	Downlight	404	15,572	2%
	Highbay	676	150,821	23%
	Non-Highbay	978	188,900	29%
	Outdoor	2,153	305,240	46%
	All	**4,211**	**660,533**	**100%**
SCE	Downlight	326	5,597	1%
	Highbay	362	156,757	39%
	Non-Highbay	1,387	74,464	19%
	Outdoor	414	160,286	40%
	All	**2,489**	**397,104**	**100%**
SDG&E	Downlight	58	3,413	5%
	Highbay	26	7,356	11%
	Non-Highbay	944	46,649	69%
	Outdoor	103	10,199	15%
	All	**1,131**	**67,617**	**100%**

N is not indicative of total number of participating sites. One site may have installed multiple measures.

The nonresidential lighting population is comprised of a variety of rebated LED fixture technologies. These rebated measures are delivered to participating customers through different program delivery mechanisms. Downstream incentives can be delivered through a direct install (DI) or deemed route where rebates are issued directly to end-use customers. Equipment can also be provided through a midstream point of purchase program which provides rebates directly through a distributor delivery channel rather than through the end-use customer. The participating distributor signs an agreement with the PA and they provide point of purchase incentives to customers. The distributor may notify the customer that they are receiving an incentive on behalf of the program, but the distributor submits the required information to the PA for payment and verification.

The evaluation team has followed the self-report framework detailed in the CPUC's *Methodological Framework for Using the Self-Report Approach to Estimating Net-to-Gross Ratios for Nonresidential Customers* to assess program influence on a customer's decision-making process to install the rebated measures. This self-report methodology is well suited for customers who participated in downstream programs, but not for those customers participating in a midstream point of purchase program. Given there is no existing NTG framework or survey guide for nonresidential midstream LED measures, the evaluation team has not conducted primary ex post research on measures delivered in this manner.[2] As a result, this NTG analysis for PY2017 focuses exclusively on downstream LED fixture installations and ex ante NTG ratios for all midstream LED fixtures will be passed through. The specific midstream programs excluded from ex post evaluation are summarized below:

- SCE – Midstream Point of Purchase Program MPOP (SCE-13-SW-002H)
  - Qualifying fixture technologies include LED T8 tubes, high/low bays and downlight fixtures
- SDG&E – Statewide Deemed Incentive Program (SDGE3223)
  - Qualifying fixture technologies include LED T8 tubes

[2] The evaluation team will develop an NTG framework and conduct in-depth interviews with lighting distributors for PY2018. These distributors installed both program eligible lamps and fixtures, so the PY2018 NTG analysis will include both measure group types.

Figure 4-1 and Figure 4-2 present the distribution of lifecycle energy savings for indoor and outdoor LED fixtures by program delivery in SCE and SDG&E, respectively. PG&E had no LED fixture measures rebated through a midstream point of purchase channel in PY2017.

FIGURE 4-1: PY2017 DISTRIBUTION OF EX ANTE SAVINGS FOR LED FIXTURES BY PROGRAM DELIVERY (SCE)

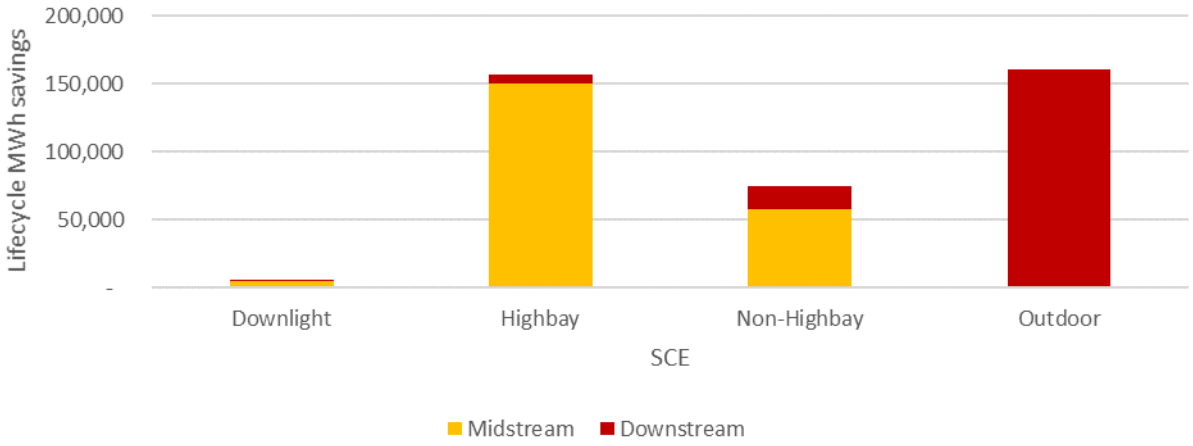
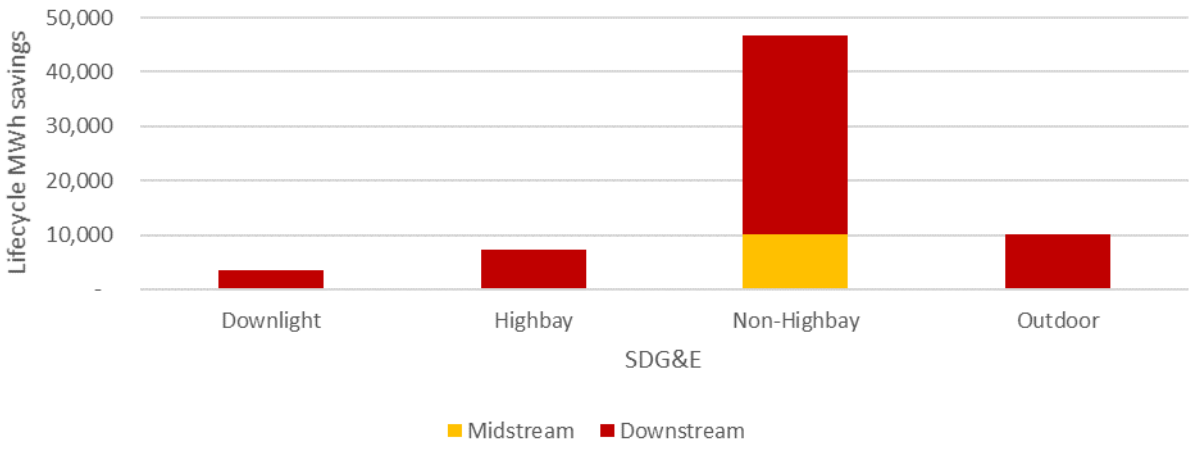


FIGURE 4-2: PY2017 DISTRIBUTION OF EX ANTE SAVINGS FOR LED FIXTURES BY PROGRAM DELIVERY (SDG&E)



SCE delivered outdoor LED fixture incentives exclusively through downstream delivery paths, so each of the PY2017 claims for these measures have been included in the sample frame for ex post evaluation. Highbay and non-highbay measures, however, were rebated through both downstream and midstream programs with most ex ante savings coming from a midstream point of purchase program. For SDG&E, qualifying LED T8 tubes were rebated through a midstream program delivery (roughly 22% of lifecycle energy savings in the non-highbay category). The remaining measures were delivered through downstream programs and were subject to ex post evaluation for PY2017.

The sample frame for indoor and outdoor LED fixtures was designed to develop statistically significant NTG parameter estimates while adhering to evaluation reporting deadlines and project budgets. The sample frame includes all types of indoor and outdoor LED fixture measures (excluding downlights) receiving rebates in PY2017 through a downstream program delivery mechanism. The evaluation team utilized a stratified random sampling approach to produce ex post NTG ratios for the evaluated population.

The stratification scheme was designed to develop ex post NTG ratios with 10% relative precision at the 90% confidence interval (90/10). In order to develop estimates at that level of precision, the evaluation team set sampling targets based on coefficients of variation[3] (COV) developed from previous nonresidential lighting NTG studies conducted for California IOUs using the self-report framework. Impact evaluations from 2013-2015 reveal a COV of 0.3 to 0.4 for ex post NTG estimates from rebated lighting measures installed throughout those program years. Table 4-2 presents how the relationship between sample size and coefficients of variation (COV) affect resulting precision estimates at the 90% confidence interval. With a COV of 0.4, the evaluator could achieve a 10% relative precision at the 90% confidence interval with 50 sample points. As the variability in the individual NTG estimates increases relative to the mean, much larger sample sizes are required to obtain a similar level of precision.

TABLE 4-2: SAMPLE SIZE REQUIREMENTS AND COEFFICIENT OF VARIATION AT THE 90% CONFIDENCE INTERVAL

		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Sample Size	5	0.09	0.18	0.27	0.36	0.45	0.54	0.63	0.72	0.81	0.90
	10	0.06	0.11	0.17	0.23	0.29	0.34	0.40	0.46	0.52	0.57
	20	0.04	0.08	0.12	0.15	0.19	0.23	0.27	0.31	0.35	0.39
	30	0.03	0.06	0.09	0.12	0.15	0.19	0.22	0.25	0.28	0.31
	50	0.02	0.05	0.07	0.09	0.12	0.14	0.17	0.19	0.21	0.24
	100	0.02	0.03	0.05	0.07	0.08	0.10	0.12	0.13	0.15	0.17
	150	0.01	0.03	0.04	0.05	0.07	0.08	0.09	0.11	0.12	0.14
	300	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10

The resulting sample design developed at the commencement of this impact evaluation is presented below in Table 4-3. The evaluation team stratified the population of indoor and outdoor LED measures by program administration (PA) and technology type (indoor highbay, indoor lowbay and exterior LED fixtures). The sample of projects were drawn from these stratum and target completes were set for each stratum based on the COV mentioned above and the total number of projects available in the population (as well as the distribution of ex ante lifecycle energy savings associated with each technology type). The total number of projects represented in the population (shown as "N") and the sample targets (shown as 'n') are presented along with the ex ante population savings represented in each stratum.

[3] The coefficient of variation is the standard deviation of a parameter divided by its mean.

TABLE 4-3: PY2017 DOWNSTREAM LED FIXTURE PHONE SURVEY SAMPLE DESIGN

PA	LED Fixture Type	Population Frame			Sample Design	
		N	Lifecycle Gross MWh Savings	% of MWh Savings	n	90% CI (Expected)
PG&E	Highbay	676	150,821	23%	30	90/10
	Non-Highbay	978	188,900	29%	30	90/10
	Outdoor	2,153	305,240	47%	60	90/5-10
	All	**3,807**	**644,961**	**100%**	**120**	**90/5**
SCE	Highbay	77	6,715	4%	15	90/15-20
	Non-Highbay	957	16,455	9%	30	90/10
	Outdoor	405	160,286	87%	60	90/5-10
	All	**1,439**	**183,456**	**100%**	**105**	**90/5**
SDG&E	Highbay	26	7,356	14%	15	90/15
	Non-Highbay	880	36,576	68%	40	90/5-10
	Outdoor	103	10,199	19%	20	90/10
	All	**1,009**	**54,131**	**100%**	**75**	**90/5-10**

The evaluation team planned to conduct a total of 300 phone interviews with end-users receiving rebates in PY2017 for the LED fixture types detailed above – 120 in PG&E, 105 in SCE and 75 in SDG&E territories. Some stratum like highbay measures in SCE and SDG&E have a limited number of participating sites whereas other measures, like outdoor fixtures rebated in PG&E territory have a much greater number of sites available for sampling.

5 GROSS IMPACT PARAMETER ANALYSIS

This section of the report details the parameter and gross impact analysis for each of the indoor LED measures presented throughout this report – indoor A-Lamps, reflector lamps and downlighting. Each of these parameters represents an input into the savings algorithm for these measures and includes, along with the installation rate and measure EULs – operating hours, coincidence factors (CF), post-retrofit wattages and baseline wattages. As discussed in Section 2, the evaluation team developed individual parameter impacts at different levels of aggregation. These impacts were applied back to the population of measures subject to ex post evaluation in PY2017 and compared to the ex ante claimed savings to create a gross realization rate – the gross savings realized as a result of the ex post evaluation. Below is a discussion of those parameter estimates along with summaries from the on-site data collection throughout 2013-2015. Each of the program years are based on the impact evaluation period as defined below and previously discussed in Section 2. We have also indicated the program year data source(s) used in the ex post evaluation for each parameter estimate in PY2017.

- **2013** – the data for this year represents program rebated LED technologies evaluated throughout the PY2010-2012 program years and early Q1-Q2 PY2013 data. Most program measures in this evaluation were rebated in Q3-Q4 of 2012 and Q1-Q2 of 2013.
- **2014** – the data for this year represents program rebated LED technologies evaluated throughout the entirety of PY2013 and PY2014, excluding measures from Q1-Q2 of PY2013 that were subject to review in the previous evaluation.
- **2015** – the data for this year represents program rebated LED technologies evaluated throughout the entirety of PY2015.

5.1 GROSS IMPACT METHODOLOGY

As discussed in Section 2, the evaluation team estimated ex post gross UES savings values by developing hourly impacts and impact load profiles. These profiles were then aggregated to develop an annual ex post gross energy savings value (kWh) or, averaged over specific coincident peak hours, to develop ex post gross demand savings (kW). The evaluation team then compared those UES impacts to the ex ante impacts claimed in the program tracking data to develop a ratio of ex post to ex ante gross savings. The general approach the evaluation team utilized to estimate ex post gross impacts is based on developing hourly impacts to generate an impact load profile.

$$\text{Impact\_Hour\_i} = \begin{bmatrix} (\text{BaselineWattage} \times \text{Percent\_On\_Pre\_Hour\_i}) \\ -(\text{PostWattage} \times \text{Percent\_On\_Post\_Hour\_i}) \end{bmatrix}$$

From this profile, the impacts for each measure were aggregated to develop an annual ex post gross kWh savings estimate and – averaged over specific hours – to develop an ex post gross kW savings estimate.

The evaluation team applied a single baseline methodology to develop impacts for indoor LED measures – including A-lamps, reflectors and downlight measures. This methodology, in effect, treats all measures as replacement on burnout (ROB). Below is a brief description of how the evaluation team developed first year and lifecycle ex post impacts for these measures. The individual parameter estimates are discussed in more detail thereafter.

First Year Impact

$$FirstYearImpact = Quantity\ x\ (PercentOn\ x\ (BaselineWattage\ \ - PostWattage)\ x\ ie)$$

Quantity = the quantity of measures found installed and operable on site at the time of the on-site audit. Installation rates were developed by technology type from on-site data collected throughout 2015. The installation rate analysis is discussed below in Section 5.2.1.

PercentOn = the percentage of time the equipment is "ON" throughout the year for energy savings or the percentage of time the equipment is "ON" throughout the peak demand period for demand savings. Operating hours and coincident diversity factors (CDF) were created from logger and adjusted self-report data obtained from 2013-2015 impact evaluations. These estimates were developed by technology type and building type. The operating hour analysis is presented below in Section 5.2.2.

BaselineWattage = the wattage associated with the replaced measure. These estimates were developed using a combination of baseline and program rebated post-retrofit equipment found on site throughout 2014-2015. These data revealed the distribution of baseline technologies (CFL vs. Halogen vs. LED) replaced as part of the lighting retrofit. The Energy Star Qualified Products List (QPL) was also used to estimate the pre-retrofit wattage of CFL lamp technologies based on the light output of program rebated LED technologies. The evaluation team developed wattage reduction ratios (WRR) from these data based on the technology type and wattage of the post-retrofit measure. The wattage analysis is discussed in Section 5.2.3.

PostWattage = the wattage associated with the installed measure. Post-retrofit wattages, collected on site and through make and model lookups from 2014-2015, were used in conjunction with baseline wattage estimates to develop WRRs by technology type and wattage bin. These WRRs were applied to post-retrofit wattages for each measure in the PY2017 program tracking database. Furthermore, these wattages were adjusted, based on advances in LED lamp efficacy – measured in lumens – from the time past data had been collected. For example, the light output of a 10W LED A-lamp rebated in 2014 may

have emitted 800 lumens or 80 watts/lumen, whereas a rebated 8W LED A-lamp rebated in 2017 may have the same light output or 100 watts/lumen. This analysis is also discussed in Section 5.2.3.

IE = the HVAC interactive effects. The Database for Energy Efficient Resources (DEER) provides a set of factors that were used to incorporate the kWh and kW HVAC interactive effects associated with the rebated measures. The kWh factors are multiplied by the annual kWh impact for a given measure, and the kW factors are multiplied by the kW demand impact. Different factors are applied to a given measure and participant based on the measure type, the participant's IOU, the climate zone where the participant is located, the building type of the participant and if the participant's facility is new or existing.

Lifecycle Impact

$$Lifecycle\ Impact = FirstYearImpact\ x\ EUL$$

FirstYearImpact = the energy or demand savings associated with the installed measure as discussed above.

EUL = the effective useful life of the measure. The EUL is calculated as the lamp/fixture life divided by the post-retrofit hours of operation. The post-retrofit hours of operation were estimated (as discussed above) as the percent "ON" throughout the year. The EULs were developed by technology type for lamp/fixture life and building type for hours of operation. The EUL analysis is discussed in Section 5.2.4.

5.2 GROSS IMPACTS

5.2.1 Installation Rates

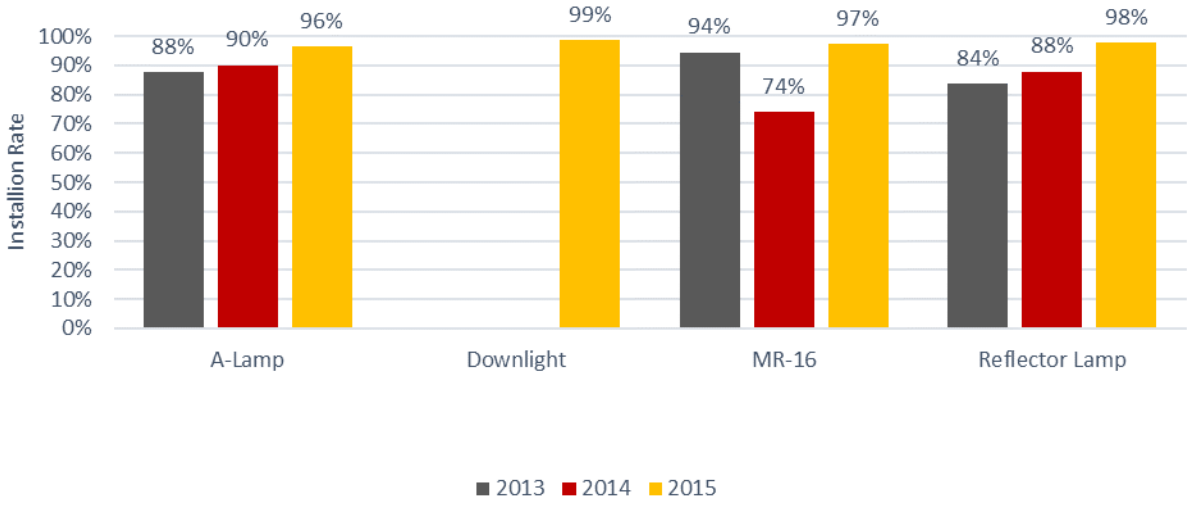
The installation rate is defined as the percentage of equipment found to be installed and operable. The evaluation team estimated the installation rate for each site-measure based on data gathered during on-site verification from 2015. The auditor collected information to ascertain the quantity of rebated measures that were installed and operable along with a total disposition for the rebated measure.

The evaluation team identified the quantity of rebated measures currently installed and in working condition (operable) during the on-site audit. The installation rate is calculated directly from this measurement:

$$\text{Installation Rate} = \frac{\text{Quantity of measures installed and operable from on-site visit}}{\text{Quantity of measures reported installed in tracking system}}$$

The evaluation team developed installation rates for PY2017 measure installations by first examining the existing primary data collected throughout 2013-2015 for each indoor measure – indoor A-Lamps, reflector lamps and downlighting. The evaluation team compared the quantity of rebated measures that were installed and operable at the time of the on-site audit and compared those quantities to those reported in the program tracking database. Figure 5-1 presents those findings.

FIGURE 5-1: INSTALLATION RATES FOR LED MEASURES BY EVALUATION YEAR



This analysis revealed that installation rates varied by LED technology type and, to a greater extent, by evaluation year. For example, the installation rates for LED A-lamps range from as low as 88% in 2013 to as high as 96% in 2015. This pattern is evident with the other technologies as well, although downlights were only evaluated in 2015. While the installation rate is defined as the percent of equipment found to be in place and operable at the time of the on-site audit, the evaluation team conducted a parallel analysis to better understand why the installation rates were less than 100% for each technology over the course of the three program periods. This analysis included additional verification data collected by the auditor from the on-site contact to identify the percent of rebated measures that were *received* by the program participant (received rate) and the percent of equipment that was:

- Failed and in place – The number of measures that were currently installed but were not in working condition (failed).
- Failed and replaced – The number of measures that had been installed, but then had failed and were replaced with a different technology.
- Removed and not replaced – The number of measures that had been installed but had been removed (either due to failure or other reasons) and were not replaced.
- In storage – The number of measures that were found in storage and had not yet been installed.

Table 5-1 presents the installation rates, received rates, storage rates and failure/removal rates for each measure type across the three evaluation years. Also shown are the sample sizes ("n") which correspond to the number of unique site-measures evaluated throughout each year.

TABLE 5-1: LIGHTING DISPOSITION AND INSTALLATION RATES FOR LED MEASURES BY EVALUATION YEAR

LED Type	Year	n	Received Rate	Failure Rate	Storage Rate	Removal Rate	Install Rate
A-Lamp	2013	129	95%	2%	0%	6%	88%
	2014	289	95%	0%	4%	1%	90%
	2015	190	99%	0%	2%	1%	96%
Downlight	2015	84	99%	0%	0%	0%	99%
MR-16	2013	50	99%	0%	0%	4%	94%
	2014	91	86%	0%	11%	1%	74%
	2015	35	100%	0%	2%	1%	97%
Reflector	2013	112	89%	3%	0%	1%	84%
	2014	278	92%	1%	2%	1%	88%
	2015	113	100%	0%	1%	1%	98%

Overall, the installation rates for indoor LED A-lamp measures in 2013 and 2014 were influenced most significantly by lower received rates (95%) and a combination of failure, storage and removal. The same is evident for both MR-16 and other reflector lamp types, although installation rates for 2014 MR-16 measures were more significantly affected by lower than expected received rates as well as equipment placed in storage.

The evaluation team did not conduct a quantitative analysis to determine why received rates were often lower than the quantities rebated. Higher failure rates in earlier program years could be explained by the saturation of earlier generation technologies that suffered from manufacturing or quality control issues. Furthermore, the higher removal rates for some measures in 2013-2014 could be explained by specific reasons offered up from on-site contacts. While these reasons were documented by the on-site auditor, they are inherently anecdotal. The most prevalent reasons why measures had been removed were:

- The light emitted from the measure was not aesthetically pleasing
- The light output was too strong
- The light output was too directional

The evaluation team ultimately decided to develop installation rates for PY2017 rebated measures using only ex post data collected from 2015. Lower installation rates for some technologies in 2013-2014 – based on potential issues with early generation LED technologies – created uncertainty surrounding how well those earlier installation rates could transfer over to more mature program eligible technologies.

Table 5-2 below presents the installation rates, received rates, storage rates and failure/removal rates for each measure type from 2015 only, along with the sample sizes ("n") and the relative precision of the installation rate estimate, measured at the 90% confidence interval, for each technology.

TABLE 5-2: LIGHTING DISPOSITION AND INSTALLATION RATES FOR LED MEASURES (2015 ONLY)

LED Type	n	Received Rate	Failure Rate	Storage Rate	Removal Rate	Install Rate	Install Rate RP
A-Lamp	190	99%	0%	2%	1%	96%	2%
Downlight	84	99%	0%	0%	0%	99%	1%
MR-16	35	100%	0%	2%	1%	97%	3%
Reflector	113	100%	0%	1%	1%	98%	2%

5.2.2 Operating Hour Analysis Methodology

Section 3 presented the total number of sites and loggers used in the development of adjusted self-reported usage schedules and business hour rates (by control type) along with an inventory of site and ex post fixture counts – by LED technology, building type, activity area – from the 2013-2015 impact evaluations.

For measures not directly monitored in 2013-2015, the evaluation team conducted an adjusted self-report and business hour analysis.[1] The evaluation team installed monitoring equipment on a variety of rebated LED measure installations throughout those program years and analyzed the logger profiles to develop hours of use (HOU) estimates and load shape profiles. These loggers were installed:

- on multiple indoor LED technologies (i.e., A-lamps, MR-16, PAR reflectors)
- across multiple program years (2013-2014)
- within a variety of facility and space types (i.e., restroom of a retail establishment or the lobby of a hotel)
- on lighting equipment connected through different controls (i.e., switch or wall/ceiling mount occupancy sensors)

[1] Appendix C provides a detailed description of the adjusted self-report methodology.

Along with the logger installations, on-site auditors also asked the on-site contact to estimate lighting usage for each activity area within their building for each hour in the day throughout a typical work week. Since different activity areas within a building generally have different lighting schedules, the site contact was asked to estimate the operating schedule for each of the activity areas where rebated measures were installed. On-site auditors also collected weekly business operating schedules from the site contact. Furthermore, the on-site auditors collected the open and close time for each day of the week for any seasonal operations or holiday schedules that deviated from the facility's normal operating schedules.

For those customers that were monitored, the evaluation team compared the participant's actual lighting usage to both their self-reported lighting usage and their business operating hours. These comparisons were made at the technology, building type, activity area and control level. Furthermore, rather than simply comparing annual operating hours, comparisons were made for four different use periods – relative to self-reported business hours:

- The Open period was defined as all hours of the day for which the business was open.
- The Opening and Closing shoulders were defined as the two hours before opening and after closing, respectively.
- The Closed period was defined as all hours for which the business was closed, and not in one of the two shoulder periods.

Finally, these comparisons were made at the day type level as well – weekday versus weekend. Figure 5-2 presents an example of these three usage profiles from a private office along with the four usage periods.

FIGURE 5-2: EXAMPLE DAILY LOAD PROFILE FOR AN LED LAMP INSTALLED IN AN OFFICE

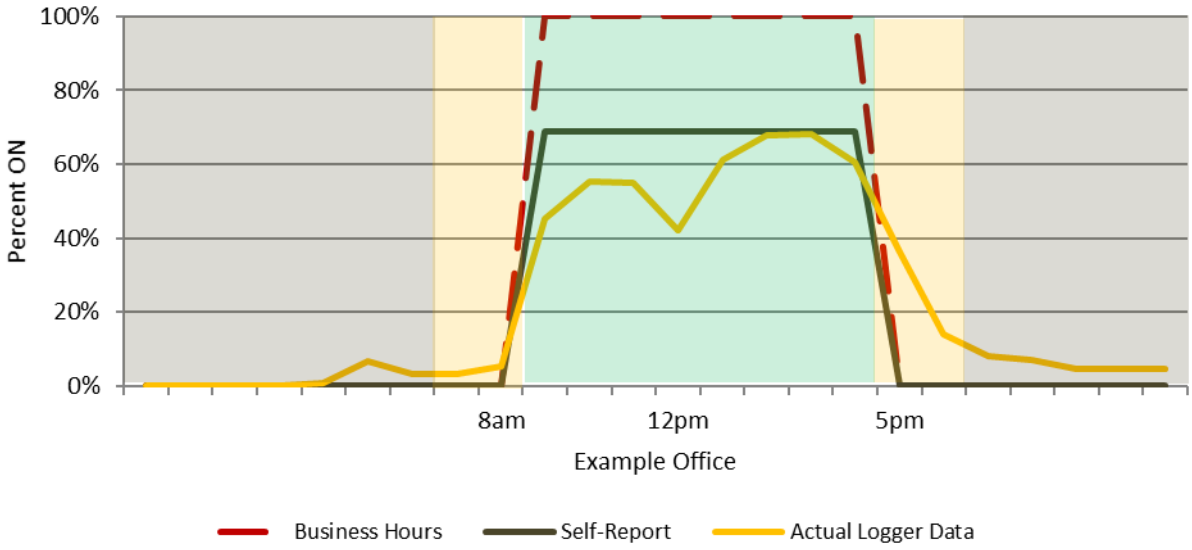


Figure 5-2 reveals a few important distinctions that, ultimately, represent the motivation behind this analysis:

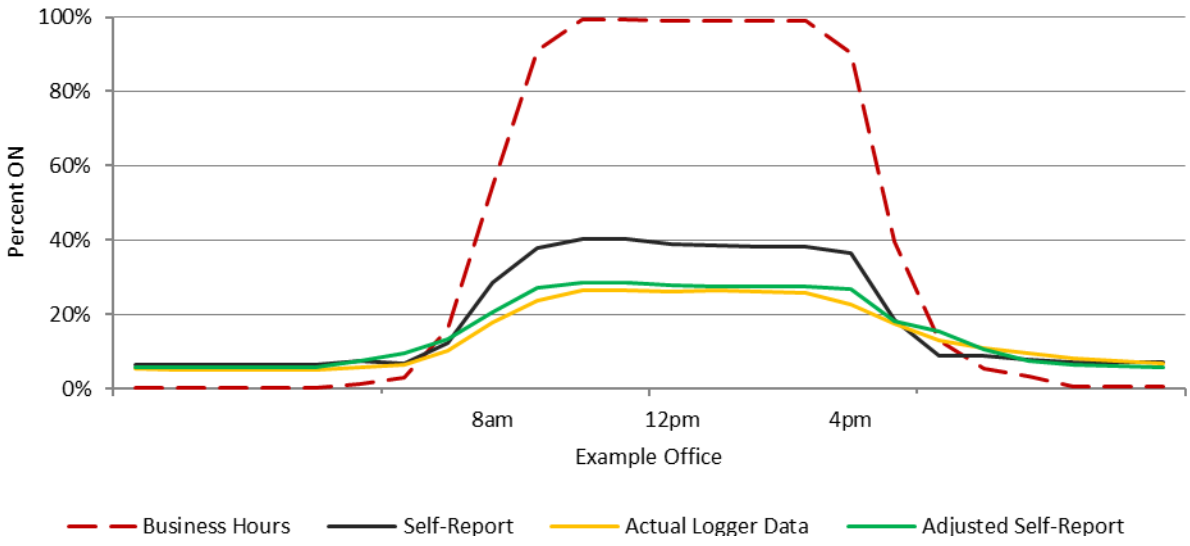
- Business hours alone are not a reliable proxy to develop use shapes and lighting load impacts.
- Customer self-reported lighting usage, which was garnered from the on-site contact, is roughly 30% less than the business hours throughout the open period (highlighted in green).
- Actual lighting usage, garnered from monitoring data, is less than both business hour and self-report estimates and there is significant hourly variability throughout that time frame.
- Business hours and self-reports – in this case – do not account for any lighting usage throughout shoulder periods (highlighted in yellow) and non-shoulder closed periods (highlighted in gray).

However, the intent of this analysis was not to accurately predict lighting usage at a single site, but rather for a large sample of similar technologies, building types and space types. In order to aggregate these adjustments and usage rates, logger data was compared to the business hours of the facility and each self-reported schedule at the facility. As mentioned above, for each hour in each day, four usage periods were generated for each facility – Open, Open Shoulder, Closed Shoulder and Closed. The actual and self-reported usage rates were then calculated for each logger by use period within the site and each logger was aggregated to a site-activity area level by measure. This aggregation only occurred when there was more than one logger installed in similar space types. The aggregation from individual loggers to activity areas was done based on the number of lamps that each logger was monitoring.

For the open period, the evaluation team developed a ratio of actual logger to self-report by technology, building type, activity area, usage period, day type and control type. Then these ratios, or adjustment factors, were developed such that they could be applied to a self-report schedule by building type and activity area, for the open period where lighting loggers were not deployed. However, for the closed and shoulder periods, rather than develop and apply adjustment factors, the evaluation team developed average usage values from the logger sample and these usage values were used directly for those time periods. The reason why adjustment factors were not developed and applied to these periods is that the self-reported usage during these periods was often claimed to be zero. A zero value cannot be adjusted by a multiplicative factor, so a constant factor was used. Again, this constant factor was the actual average usage found in the logger sample for those time periods and was applied by technology, building type, activity area, day type and control type.

By applying the adjustment factors to the open time period, and the usage values to the closed and shoulder time periods, the evaluation team developed proxy load shapes at several levels of disaggregation. Since not all technology, building type and activity area combinations were well represented, adjustment factors and usage rates were also developed at the technology-building type level as well as at the technology level alone. Figure 5-3 presents an example of average daily profiles from all 4 streams of data from the sample of offices monitored throughout the evaluation periods.

FIGURE 5-3: AGGREGRATED DAILY LOAD PROFILE FOR LED LAMPS INSTALLED IN AN OFFICE



In this example, the hourly self-reported profiles were compared against the actual hourly logger data throughout the open hours for each office and were aggregated. Average hourly usage rates were also developed during the shoulder and closed period – based on facility business hours. The resulting adjusted load profile (in green) is very similar to the actual logger profile (in yellow).

To validate this process, the evaluation team aggregated each of the site-activity area estimates for each of the time periods and day types discussed above and applied them to the self-reported schedules and business hours of sampled monitored LED participants from the 2013-2014 evaluation periods. These estimates were then aggregated and compared to the actual monitored hours collected from logger data. Table 5-3 presents the results of those comparisons.

TABLE 5-3: COMPARISON OF LOGGED AND ADJUSTED HOURS FROM 2013-2014 LED EVALUATIONS BY BUILDING TYPE

Building Type	n Sites	Monitored Hours	Adjusted Hours	Mean Difference	P-value
Assembly	60	1,762	1,681	81	0.35
Lodging	66	1,457	1,282	175	0.16
Other Industrial	11	2,605	2,719	(114)	0.38
Office - Small	104	1,932	1,943	(11)	0.95
Other	21	3,587	3,685	(98)	0.75
Restaurant - Fast Food	50	4,616	4,144	472	0.10
Restaurant - Sit Down	86	3,636	3,694	(57)	0.66
Retail - Large	31	3,457	3,375	83	0.47
Retail - Small	93	3,241	3,373	(132)	0.14
All Building Types	**522**	**2,473**	**2,391**	**83**	**0.59**

The evaluation team conducted a paired T-test to compare the monitored hours to the adjusted hours. The monitored hours represent the actual aggregated profiles of logger data from LED measures that were monitored in the 2013-2014 evaluation periods, and the adjusted hours represent aggregated profiles using the adjustment method discussed above. Overall, there is no statistically significant difference between the hours that were developed for each building type by the two methods discussed above.

Table 5-4 through Table 5-7 present the annual operating hours and CDFs developed from the 2013-2015 impact evaluations to update ex ante parameter estimates from LED A-Lamps, downlights, MR-16 and reflector lamps, respectively.[2] Also shown are the number of site-measures evaluated in 2013-2015 along with the relative precision for each estimate, measured at the 90% confidence interval, for each technology.

[2] The Commercial (COM) building type is unique to PG&E and represents a weighted distribution of HOU and CDF for several different building types. There is no 'n' presented as a result.

TABLE 5-4: LED A-LAMP POST-RETROFIT ANNUAL HOURS OF OPERATION AND COINCIDENCE FACTORS BY BUILDING TYPE

Building Type	n Sites	Annual Operating Hours	RP	Coincidence Factor	RP
Assembly	46	1,943		0.25	
Commercial (COM)	-	2,220		0.43	
Lodging	86	1,964		0.21	
Office - Small	109	1,358		0.28	
Other	55	5,198		0.69	
Restaurant - Fast Food	42	4,323		0.67	
Restaurant - Sit Down	86	4,210		0.68	
Retail - Large	6	3,658		0.67	
Retail - Small	122	2,081		0.40	
All Building Types	**551**	**2,637**	**5%**	**0.33**	**5%**

TABLE 5-5: LED DOWNLIGHT POST-RETROFIT ANNUAL HOURS OF OPERATION AND COINCIDENCE FACTORS BY BUILDING TYPE

Building Type	n Sites	Annual Operating Hours	RP	Coincidence Factor	RP
Assembly	11	1,803		0.20	
Commercial (COM)	-	2,599		0.56	
Lodging	16	4,069		0.48	
Office - Large	6	3,624		0.86	
Office - Small	7	2,558		0.59	
Other	9	4,310		0.51	
Restaurant - Sit Down	13	4,961		0.69	
Retail - Small	13	2,942		0.74	
All Building Types	**75**	**3,508**	**10%**	**0.55**	**11%**

TABLE 5-6: LED MR-16 POST-RETROFIT ANNUAL HOURS OF OPERATION AND COINCIDENCE FACTORS BY BUILDING TYPE

Building Type	n Sites	Annual Operating Hours	RP	Coincidence Factor	RP
Assembly	10	2,776		0.37	
Commercial (COM)	-	2,314		0.47	
Lodging	17	2,324		0.26	
Office - Small	11	1,529		0.47	
Other	11	2,341		0.39	
Restaurant - Fast Food	19	3,932		0.68	
Restaurant - Sit Down	27	3,536		0.75	
Retail - Large	12	3,369		0.93	
Retail - Small	51	3,198		0.75	
All Building Types	**158**	**2,698**	**10%**	**0.48**	**9%**

TABLE 5-7: LED REFLECTOR LAMP POST-RETROFIT ANNUAL HOURS OF OPERATION AND COINCIDENCE FACTORS BY BUILDING TYPE

Building Type	n Sites	Annual Operating Hours	RP	Coincidence Factor	RP
Assembly	31	1,263		0.20	
Commercial (COM)	-	2,420		0.49	
Lodging	29	2,454		0.25	
Office - Large	7	2,880		0.66	
Office - Small	65	1,923		0.44	
Other	33	3,463		0.68	
Restaurant - Fast Food	32	3,684		0.64	
Restaurant - Sit Down	54	4,120		0.74	
Retail - Large	33	4,012		0.99	
Retail - Small	87	2,908		0.69	
All Building Types	**371**	**2,977**	**4%**	**0.62**	**4%**

Overall, the evaluation team used monitored data and adjusted self-report data from a total of 551, 75, 158 and 371 evaluated sites to develop annual operating hour and CDF estimates for LED A-Lamps, downlights, MR-16 and reflector lamps, respectively. These estimates were garnered from a wide variety of business types – small retail/offices, restaurants, hotels, etc. The operating hour estimates for

each building type were most influenced by the distribution of measure installation by activity area. As presented in Section 3 (Table 3-4), for example, program rebated A-Lamp installations were verified in guest rooms for 75 of the 86 sites. Downlight measures, however, were verified more substantially in hallways and lobbies (14 of the 16 sites). Likewise, for small retail establishments, LED A-Lamp installations in restrooms represented a much greater distribution of measure installations than for downlights and reflector technologies. For those measures, installations were most often verified in retail sales areas.

Not all building types within the population of PY2017 program participants were represented in the sample of sites analyzed in 2013-2015. As an example, the evaluation team did not verify measure installations in many elementary schools, even though some PY2017 program participants installed qualifying LED measures within them. Since the evaluation team could not develop ex post estimates for these facility types, the ex ante operating hours were "passed through".

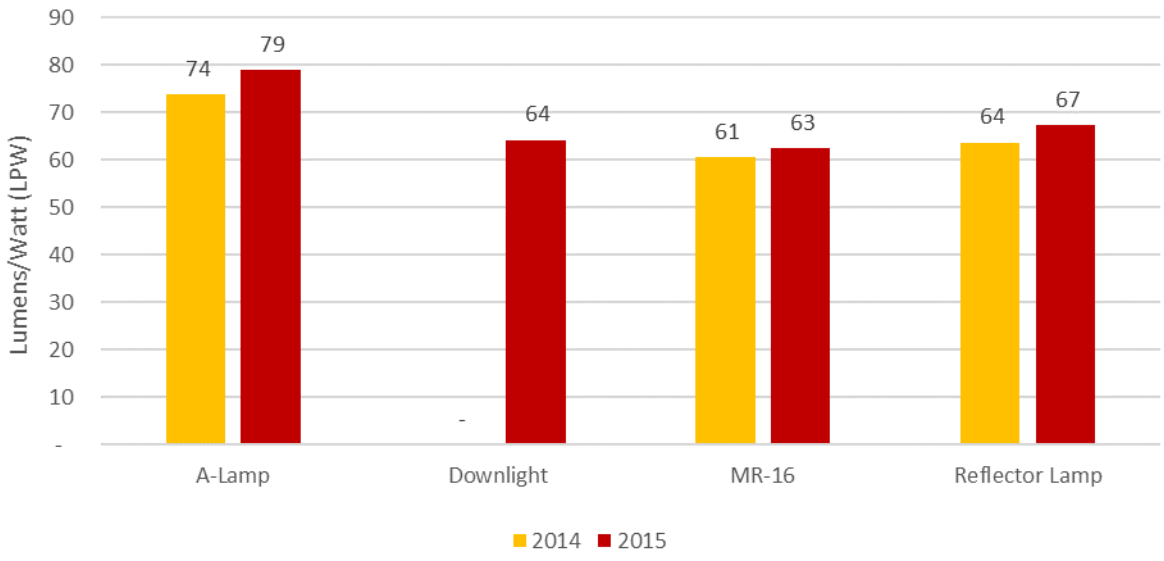
5.2.3 Pre- and Post-wattage Analysis Methodology

Another key set of parameters in the impact algorithm are the pre- and post-wattages. The evaluation team utilized on-site verification data and several other data sources to support development of wattage estimates for each indoor LED measure. The make and model database of rebated and installed LED technologies from 2014-2015 served as the backbone for this analysis along with:

- Energy Star QPL
- Energy Independence and Security Act (EISA) of 2007
- On-site verification baseline data from 2014-2015
- Workpaper review
- March 1st and May 26th, 2017 Screw-in Lamp Disposition

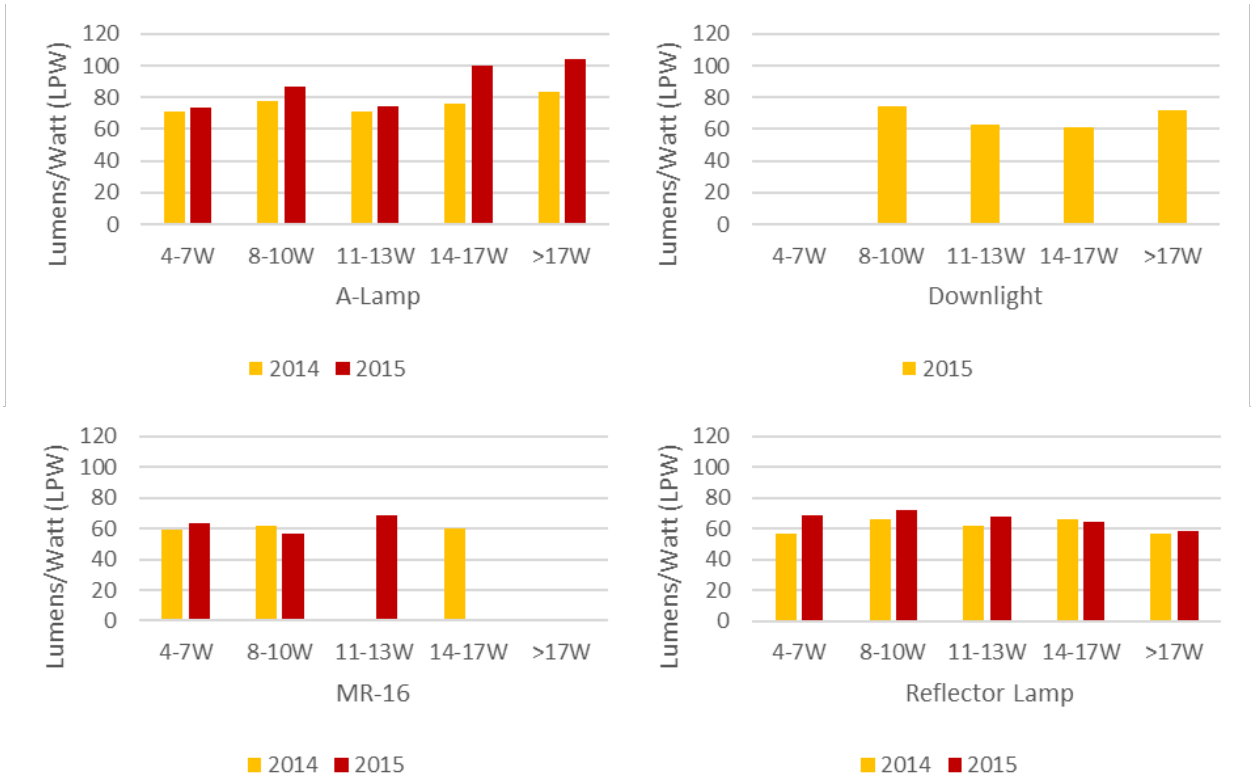
The evaluation team combined the wattage and light output specifications for almost 900 site-measures evaluated throughout 2014 and 2015. This dataset included LED A-Lamps, downlights, MR-16s and a variety of other reflector technologies. However, LED technologies have matured over the past several years, both in terms of quality and efficacy. Efficacy in this regard is defined as the light output of the measure per watt (lumens/watt). The higher the lumens per watt, the more efficient the lamp is in producing light output per unit of power. Figure 5-4 presents the results of that initial analysis.

FIGURE 5-4: EFFICACY (LUMENS/WATT) OF PROGRAM REBATED LED MEASURES (2014-2015)



For each of the 3 LED lamp types – A-lamps, reflector lamps and MR-16s – the efficacy of the program rebated bulbs increased from the 2014 evaluation period to 2015. These averages are weighted by the number of lamps each of the measures represents in their respective population. The 2013 estimates – which were rebated mostly in Q7-Q8 of 2012 and Q1-Q2 of 2013 – represent a very limited number of measure wattages. In fact, 51 of 52 site-measures evaluated during that period were 8-Watt lamps. Beginning in 2014, the evaluation team found a greater diversity of program eligible bulbs both in terms of wattage and light output. Given the limited variety of rebated LED lamp measures from 2013, the evaluation team did not include them in the wattage analysis. Again, downlighting was only evaluated as part of the 2015 evaluation. This trend is also evident at different wattage ranges and is presented in Figure 5-5.

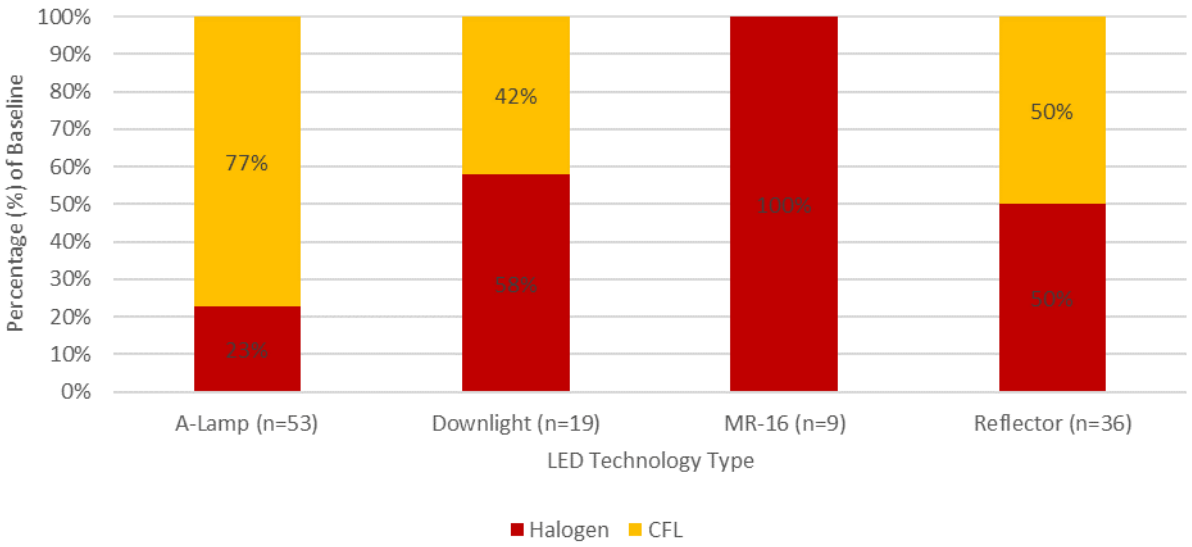
FIGURE 5-5: EFFICACY (LUMENS/WATT) OF PROGRAM REBATED LED MEASURES BY WATTAGE BIN (2014-2015)



Overall, the increased efficacy of LED lamp technologies is confirmed in product literature and other evaluations conducted throughout the past several years. The evaluation team understands these gains and the presumption that program eligible bulbs in PY2017 are more efficient than bulbs rebated in 2014 and 2015. As an example, an average 10-watt A-lamp rebated in 2015 was found to deliver 800 lumens – or 80 lumens per watt. However, in PY2017 an 8.9-watt A-Lamp *could* deliver the same light output, since the rebated lamp is more efficient. The evaluation team took these increases in efficacy into account when developing the ex post wattages for PY2017 LED measures.

Next the evaluation team combined all the pre-retrofit equipment to determine the distribution of baseline technologies found on site throughout the 2014-2015 evaluation periods. The evaluation team subset out all baseline equipment that was undetermined or not verified on premise at the time of the on-site audit. Baseline equipment had often been replaced throughout the building prior to the on-site verification, so the on-site auditors investigated non-rebated or storage areas to ascertain the baseline equipment type. Figure 5-6 presents the distribution of baseline technologies found on site along with the number of confirmed technologies.

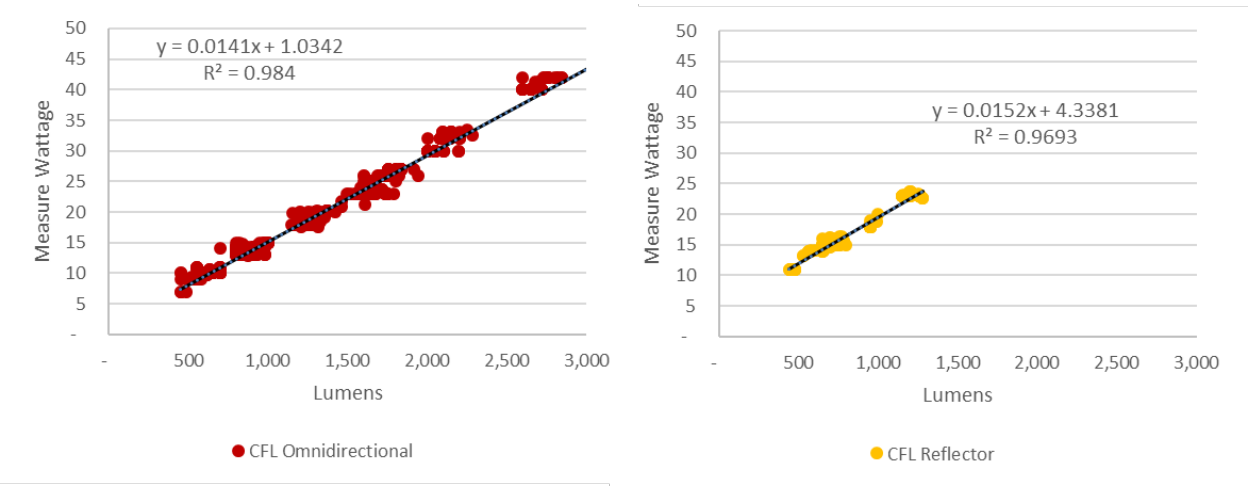
FIGURE 5-6: DISTRIBUTION OF BASELINE TECHNOLOGY (2014-2015)



For LED omnidirectional A-lamps, CFLs represent 77% of the baseline technology confirmed by the on-site auditor. They also found general service incandescent halogens as well (23%). Halogen reflector lamps represent 100% of the baseline for rebated MR-16 measures, although the baseline technologies found are comprised of 9 verified measures. The split for other directional reflector technologies and downlighting was more evenly distributed. Again, these baseline technology distributions were garnered from visual verification throughout the 2014-2015 evaluation periods as defined at the beginning of this section. The distribution of baseline technologies has a significant influence on the underlying wattage of the pre-existing equipment and, by extension, the change in wattage (or delta) from the baseline to the retrofit.

Next, the evaluation team uploaded the Energy Star QPL for CFL measures to gather wattage information and lumens for qualifying A-lamp, spiral and reflector technologies. The evaluation team subset any CFL technology that was available on the market or had qualified as Energy Star from 2014 through 2016. The average efficacy of CFL omnidirectional and reflector technologies remained static throughout that 3-year time period – 66 lumens/watt for omnidirectional lamps and 48 lumens/watt for reflectors. Furthermore, the evaluation team assumed program participants were installing rebated LED equipment which was similar in light output to the technology they were replacing at the time of the retrofit. Figure 5-7 presents the linear relationship between the wattage and light output for both CFL omnidirectional and directional lamps on the Energy Star QPL.

FIGURE 5-7: LUMENS AND WATTAGE FOR ENERGY STAR QUALIFYING CFLS (2014-2016)

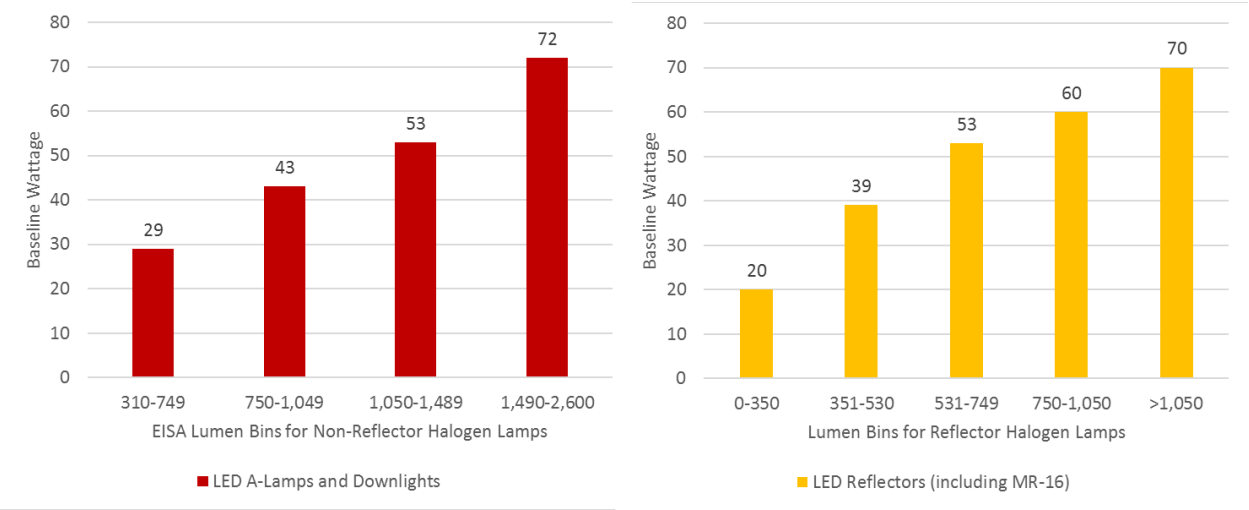


The evaluation team then combined these data and linear equations with the database of rebated LED measures from 2014-2015. The database included every indoor LED technology rebated, where make-model information was collected, and the look-up provided a valid measure wattage and light output. The light output for each LED measure verified in 2014-2015 was input into the equation as the independent variable and the evaluation team "backed-out" the wattage of the pre-existing CFL technology. The evaluation team assumed:

- LED A-lamps were replacing spiral or A-lamp omnidirectional CFLs
- LED downlights, MR-16s and other reflector measures were replacing directional CFL technologies

As presented in Figure 5-6, however, rebated LED measures were also replacing higher wattage halogen technologies. In other words, CFLs did not comprise the total baseline for program rebated measures. To account for this, the evaluation team also developed baseline wattage estimates for these technologies based on EISA lumen bins for general service non-reflector halogens. The evaluation team also conducted an analysis of reflector halogen technologies not subject to the EISA requirements. Those estimates are presented below in Figure 5-8.

FIGURE 5-8: LUMEN BINS AND WATTAGE FOR HALOGEN LAMPS

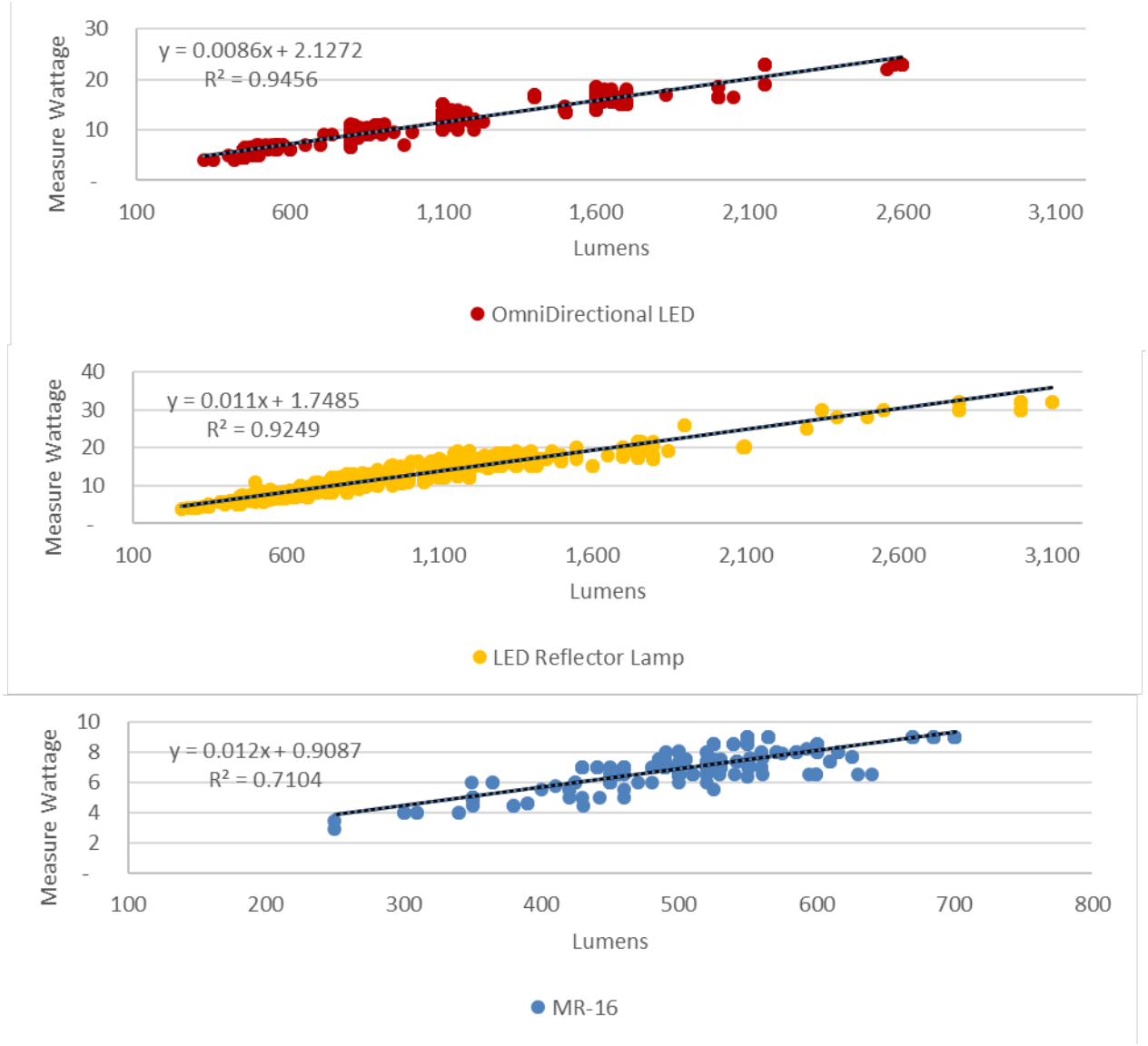


If the light output for each LED measure verified in 2014-2015 fell within one of these bins, the evaluation team assumed the given baseline wattage of the halogen technology. As an example, an LED A-lamp with 800 lumens verified on site in 2015 would assume a 43-watt halogen baseline (750-1,049 bin) and an LED reflector lamp with that same light output would assume a 60-watt reflector halogen baseline (750-1,050 bin). The evaluation team then developed a weighted average baseline wattage for each measure, based on the distribution of baseline technologies (CFL vs. Halogen) presented in Figure 5-6. Based on the lumen levels of the installed and rebated equipment verified on site in 2014-2015, the basic equation used to develop baseline wattage estimates became:

- LED A-lamp – (0.77*CFL *omnidirectional* wattage) + (0.23**non-reflector* halogen wattage)
- LED Downlight – (0.42*CFL *reflector* wattage) + (0.58**reflector* halogen wattage)
- LED MR-16 – (0.00*CFL *reflector* wattage) + (1.00**reflector* halogen wattage)
- LED Reflector – (0.50*CFL *reflector* wattage) + (0.50**reflector* halogen wattage)

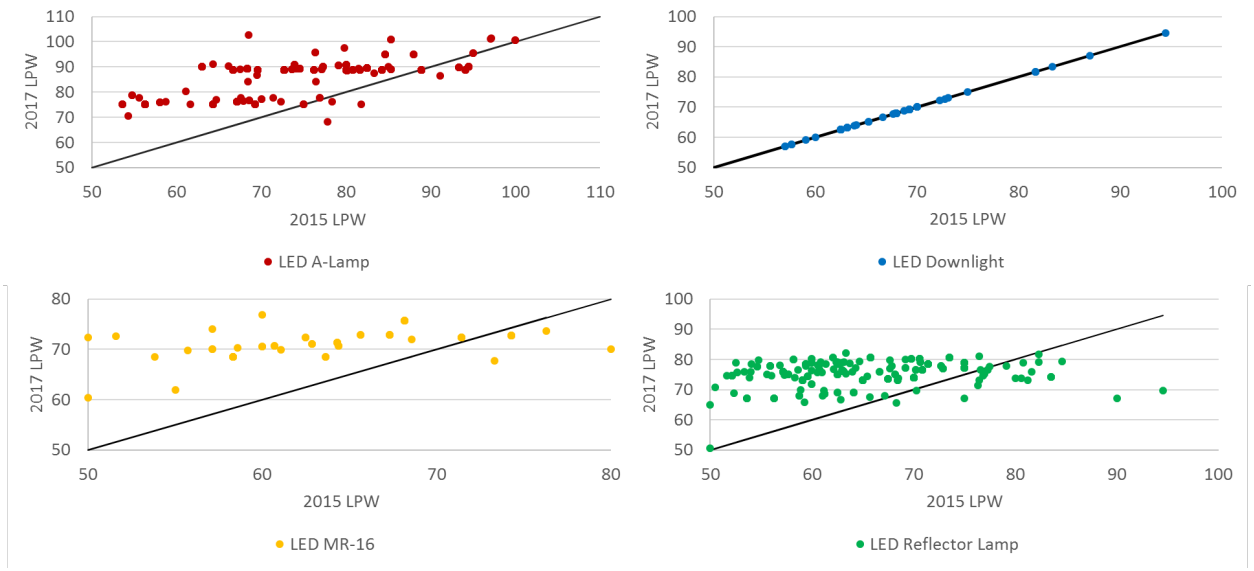
Finally, and considering the efficacy improvements in rebated LED technologies from 2014-2015 to PY2017, the evaluation team uploaded the Energy Star QPL for LED measures available on the market in 2016 and 2017 to gather wattage information and lumens for qualifying A-lamp, MR-16 and other reflector technologies. Again, we developed a basic linear model, where the light output of the qualifying technology served as the input to estimate the measure wattage of the LED. Like the CFL baseline analysis, we used the 2014-2015 lumens from verified measure installations to "back-out" the more efficient LED wattage. Those qualifying data are presented below in Figure 5-9.

FIGURE 5-9: LUMENS AND WATTAGE FOR ENERGY STAR QUALIFYING LED (2016-2017)



The evaluation team tested this approach by comparing the efficacy of each installed and rebated LED measure from 2014-2015 using the actual wattage of the equipment – confirmed by look-ups – and the estimated wattage assuming qualifying LED technologies have become more efficient. The relationship between the efficacy, measured as LPW, is presented below in Figure 5-10.

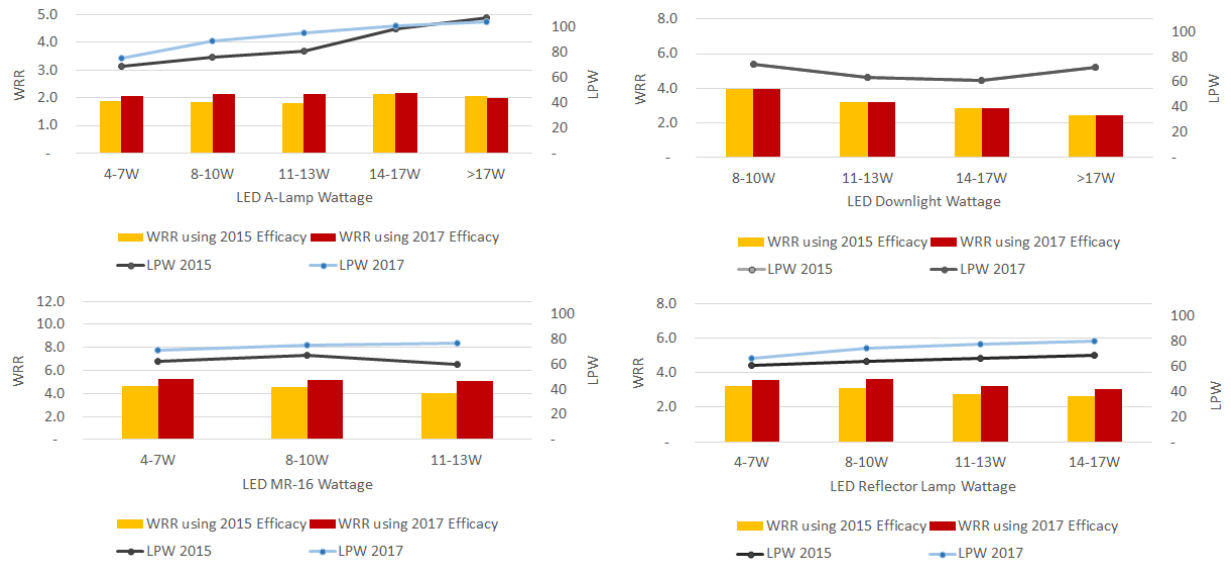
FIGURE 5-10: COMPARISON OF LED EFFICACY (LPW) USING 2015 WATTAGES VS 2017 WATTAGES



Each panel presents the LPW for each site-measure evaluated in 2014-2015 by technology type. The horizontal axis represents the LPW for each measure using the verified lumens and wattage from the 2014-2015 evaluation periods. The vertical axis presents the LPW for each measure using the verified lumens from the 2014-2015 evaluation periods and, the wattage which accounts for efficacy gains in qualifying LED technologies available in 2016 and 2017. If efficacy remains constant over the two periods, each site-measure would fall along the black line. If the estimated efficacy of the site-measure is greater in 2017 than in 2015, the measure is presented above the black line (and vice versa). Most site-measures are above the black line, which suggests that program eligible LED technologies have become more efficient at producing light than technologies rebated in 2014-2015. This exercise was not conducted on LED downlights given the lack of data available for these technologies, so the efficacy for PY2017 measures remains unchanged from 2015.

Equipped with an updated post-retrofit wattage and an estimated baseline wattage, the evaluation team developed wattage reduction ratios (WRRs) for each measure in the 2014-2015 evaluation database. The WRRs were developed as the baseline wattage divided by the post-retrofit wattage. These ratios can then be applied to the measure case wattage of each program rebated LED in the PY2017 program tracking database to develop ex post delta wattage estimates for each measure. The WRRs were developed at the nominal wattage level (i.e., 8W LED A-lamp) if there were sufficient observations evaluated at that level. If not, the WRRs were aggregated to a wattage bin level (i.e., LED A-Lamp 4-7W). Once again, the evaluation team compared the resulting WRRs, if using the 2014-2015 post-retrofit wattages, against the more efficient estimates. Figure 5-11 presents those comparisons.

FIGURE 5-11: COMPARISONS OF WRR AND LPW USING 2015 WATTAGES VS 2017 WATTAGES



The WRRs for each LED technology and wattage bin are plotted using the two methodologies along with the average LPW for each technology and bin (the right vertical axis). The WRR for each wattage bin is greater using the 2017 wattage data, given the advances in LED efficacy. Furthermore, for all technologies –excluding higher wattage LED A-lamps – the LPW for each wattage bin is greater using the 2017 wattage data (the blue line is above the black line).

Overall, the WRRs vary across LED types as well as within LED types. LED A-lamps have the lowest ratios of the four measure types which is most influenced by the greater distribution of CFL technologies in the baseline. Downlighting was not an evaluated measure in 2013-2014, so the WRRs for this measure category are based on 2015 data alone. The WRR for LED MR-16s is the largest with most installed measures in the 4-7W range. The WRRs for other reflector technologies are similar, but they decrease as the installed measure wattage increases.

Table 5-8 presents the WRRs developed from this analysis and utilized to update delta wattage estimates from PY2017 program LED measures. These estimates were also developed at the nominal installed measure wattage as well. The binned WRRs were used when there were insufficient – less than 10 site-measure – observations in the sample data set. Overall LED technology-specific estimates were utilized when there were insufficient sample observations in the respective wattage bin.

TABLE 5-8: EX POST PRE- AND POST-WATTAGES AND WRR FOR LED MEASURES

LED Type	Wattage Range	n Measures	Pre Watts	Post Watts	WRR	WRR RP
A-Lamp	4-7W	101	12.5	6.1	2.04	0%
	8-10W	303	19.5	9.1	2.14	0%
	11-13W	12	25.2	11.8	2.13	1%
	14-17W	6	34.8	15.9	2.18	1%
	>17W	3	40.1	20.2	1.99	4%
	All	**425**	**19.1**	**8.9**	**2.14**	**0%**
Downlighting	4-7W					
	8-10W	8	39.0	9.9	3.93	7%
	11-13W	57	39.9	12.5	3.19	4%
	14-17W	2	42.4	14.9	2.86	13%
	>17W	10	52.5	21.8	2.41	8%
	All	**77**	**40.3**	**12.7**	**3.18**	**4%**
MR-16	4-7W	72	33.1	6.3	5.27	3%
	8-10W	6	50.0	9.7	5.14	6%
	11-13W	1	60.0	11.7	5.12	0%
	14-17W					
	>17W					
	All	**79**	**34.4**	**6.6**	**5.25**	**2%**
Reflectors	4-7W	39	24.2	6.8	3.56	2%
	8-10W	119	35.7	9.8	3.65	0%
	11-13W	108	39.5	12.2	3.22	1%
	14-17W	36	46.4	15.1	3.07	1%
	>17W					
	All	**302**	**37.3**	**11.1**	**3.36**	**1%**

The above approach and resulting WRR analysis were only applied to PY2017 claims which utilized a similar methodology from the ex ante perspective. The May 26th, 2017 workpaper disposition for screw-in lamps developed minimum efficacy requirements for program eligible screw-in LEDs of all types. After reviewing the program tracking data for PY2017, the evaluation team found three workpapers that had been updated to account for the new requirements:

- PGECOLTG165-4
- SCE17LG133.1
- WPSDGENRLG0106-4

These minimum efficacy requirements for 2017 are based on EISA bins (i.e., 68 LPW for EISA 40W equivalent bulbs) and consideration for the distribution of lamp technologies in the baseline. Table 5-9 presents the approved delta wattage values by EISA wattage bin and lamp efficacy along with results from an analysis conducted by the evaluation team.

TABLE 5-9: APPROVED LED A-LAMP MEASURE DEFINITIONS

EISA Bin	LPW	Ex Ante Delta Watts	# of Ex Post Observations	Ex Post Delta Watts
40	68	6.8	3	6.1
	80	7.6	98	6.4
	90	8.7	2	7.0
	100	8.8		
60	80	7.8		
	90	9.2	301	10.4
	100	10.9		
	110	11.0		
75	90	12.6	7	13.3
	100	13.5	5	13.5
	110	15.4		
	120	17.6		
100	90	17.2		
	100	19.1	9	18.9
	110	19.9		

Table 5-9 presents the approved delta wattage values for each EISA bin and range of lamp efficacy (LPW). The evaluation team also conducted our own analysis from data used to develop the WRRs discussed above. We compared the baseline wattages for LED A-lamps to the measure case wattages – both of which were informed by the light output of LED A-lamp measures in the 2014-2015 on-site database. We binned the efficacy of each LED technology into the prescribed LPW (i.e., 68 LPW vs. 90 LPW) and developed delta wattage estimates, based on those groupings. The cut points developed from the database of LPWs was somewhat arbitrary (i.e., an LED measure with 87 LPW were binned into the 90 LPW category).

However, and as evident above, the ex post evaluation data from 2014-2015 was comprised of measures mostly found in the 40W Lumen bin – 80 LPW and the 60W Lumen bin – 90 LPW. We did not have sufficient primary data to develop delta wattages for many approved measure definitions. However, the analysis revealed that there are no demonstrable differences between the approved ex ante delta watts and those developed based on actual on-site data analysis. As a result, we decided to pass through the approved delta wattage estimates for all claims that adhered to this methodology.

5.3 EUL/RUL ANALYSIS

In order to develop lifecycle savings for each measure, the EUL was calculated. The EUL is a function of the service life of the measure divided by the ex post annual operating hours. The EUL is defined as:

EUL = Minimum of either $\frac{Service\ Life\ (hours)}{Annual\ Hours\ of\ Use}$ or 12 years.

Where:

Service Life = the rated service life of the measure.

Annual Hours of Use = the site-specific estimate of post-retrofit annual hours of use (HOU) as outlined in Table 5-4 through Table 5-7 or the ex ante HOUs.

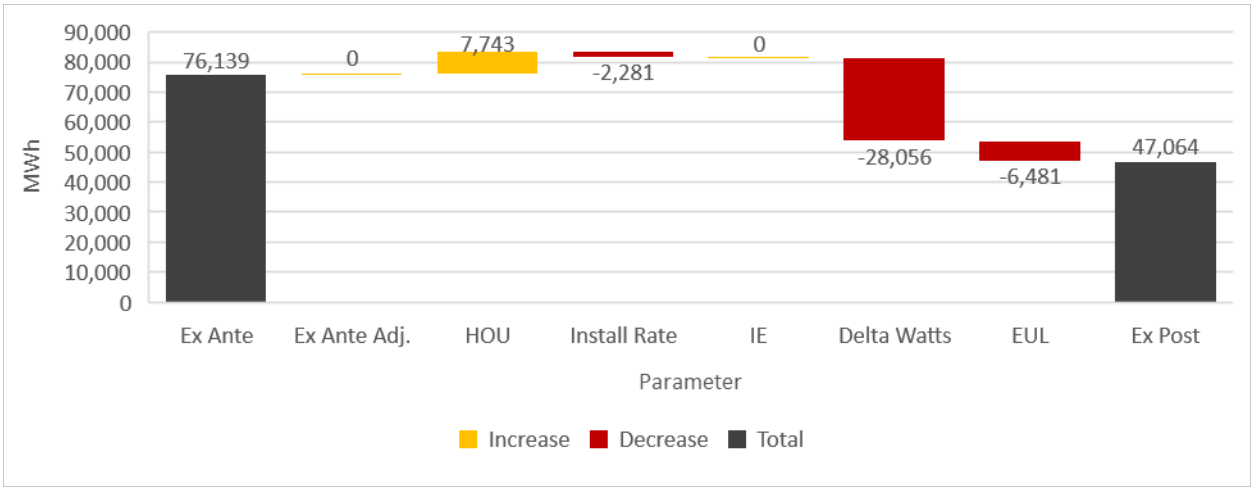
The evaluation team did not conduct an analysis on the rated life for each of the LED measures installed in PY2017. We ultimately utilized the ex ante service life for each technology – 20,000 hours for LED lamps and 50,000 hours for downlight. As a result, any differences between the ex post EULs and the ex ante claimed EULs are predicated on differences in the assumed annual hours of use.

5.4 GROSS IMPACT PARAMETER COMPARISON (EX POST VS EX ANTE)

The objective of this study was to perform a measure and/or measure-parameter impact evaluation, utilizing existing evaluation data and new primary evaluation data, to update existing gross or net savings estimates and inform future savings values for specific lighting measures identified in the ESPI decision. As presented throughout this report, the gross savings values incorporate several different variables, including installation rates, operating hours, coincidence factors, installed/replaced wattages and EULs. The differences in ex post savings relative to the ex ante claim are predicated on differences among these variables. The following exhibits present a high-level comparison of the ex ante assumptions to the ex post impacts that were developed as a result of the gross analysis.

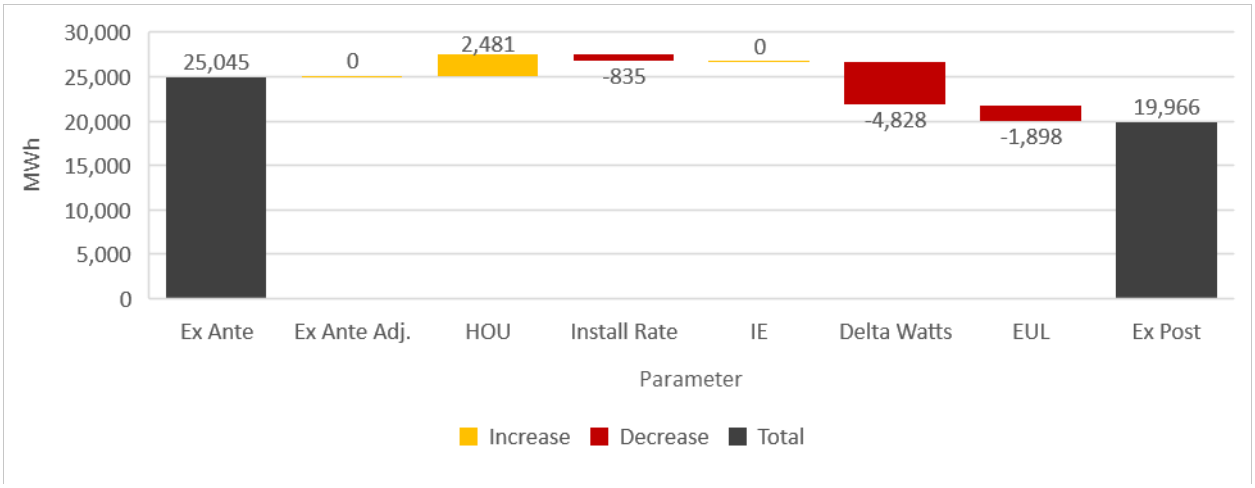
Section 7 presents the final aggregated first year and lifecycle GRRs and NRRs along with the specific algorithm that the evaluation team used to develop these rates and the ex post impacts, but the sample level results are presented below to better understand why the GRR is not equal to 100% for the indoor LED lamp measures that were evaluated.

FIGURE 5-12: PG&E LED A-LAMP EX ANTE TO EX POST IMPACT WATERFALL



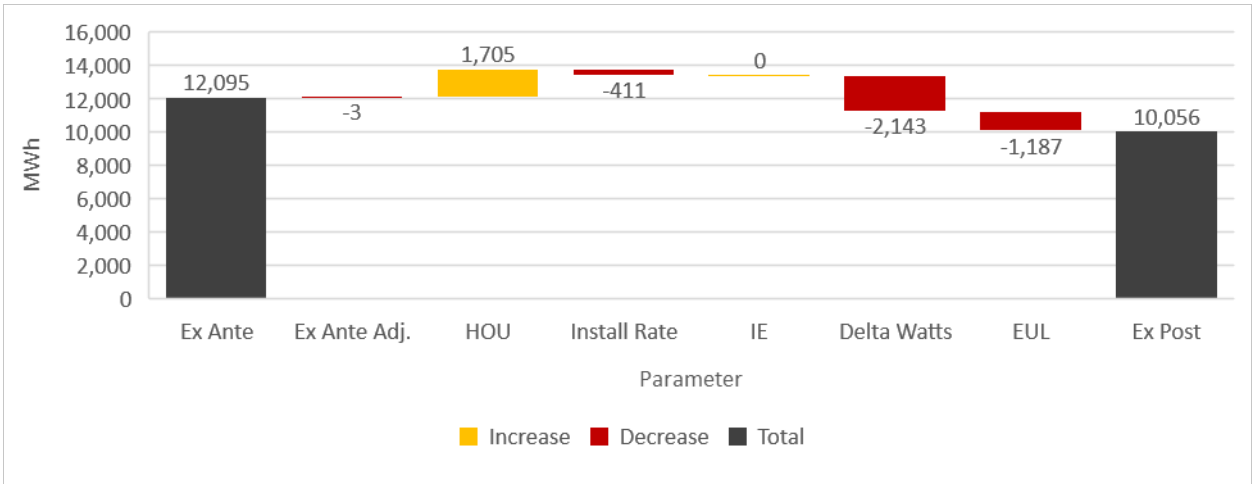
For PG&E A-lamp measures, ex post hours of use (HOU) were greater (in aggregate) than the ex ante claim, which leads to a slight increase in the GRR. The evaluation team estimated an installation rate of 96% which was lower than the ex ante claim, which reduces the GRR. The ex post delta wattage (the difference between the baseline and installed wattage) had the most significant impact on the GRR. The evaluation team estimated WRRs for A-lamp measures that were lower than ex ante claims. Finally, the ex post EUL reduced the lifecycle GRR because the ex post HOU were higher. Since the evaluation team did not update the ex ante service life for measures, the HOU (the denominator in the EUL calculation) have an inverse effect on the EUL. If ex post HOU are higher than the ex ante claims, the EUL will be lower – and vice versa.

FIGURE 5-13: SCE LED A-LAMP EX ANTE TO EX POST IMPACT WATERFALL



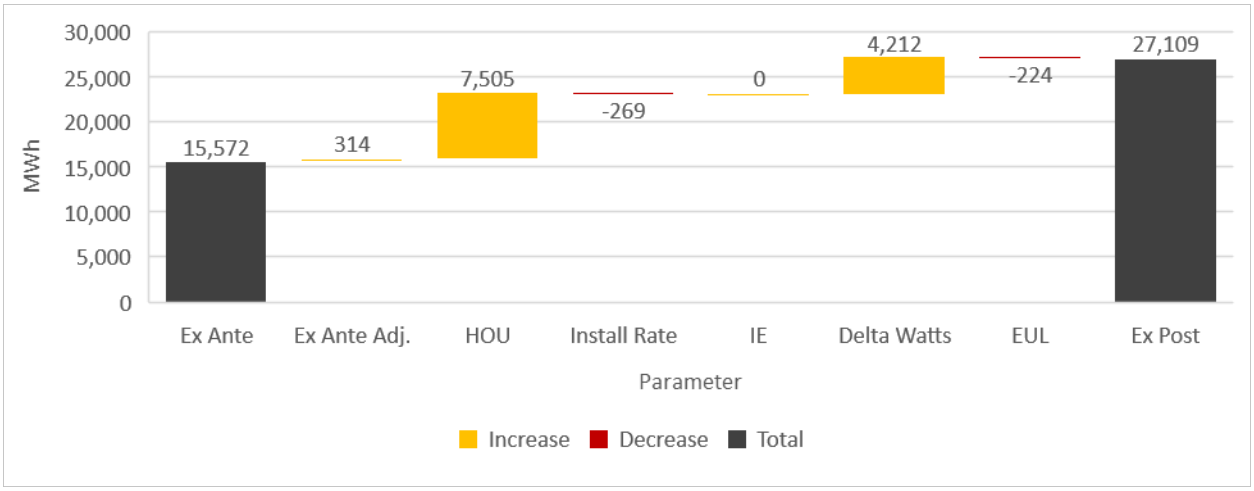
For SCE A-lamp measures, ex post hours of use (HOU) were greater (in aggregate) than the ex ante claim, which leads to a slight increase in the GRR. The evaluation team estimated an installation rate that was slightly lower than the ex ante claim, which reduces the GRR. The ex post delta wattage (the difference between the baseline and installed wattage) had the most significant impact on the GRR. Finally, the ex post EUL reduced the lifecycle GRR because the ex post HOU were higher.

FIGURE 5-14: SDG&E LED A-LAMP EX ANTE TO EX POST IMPACT WATERFALL



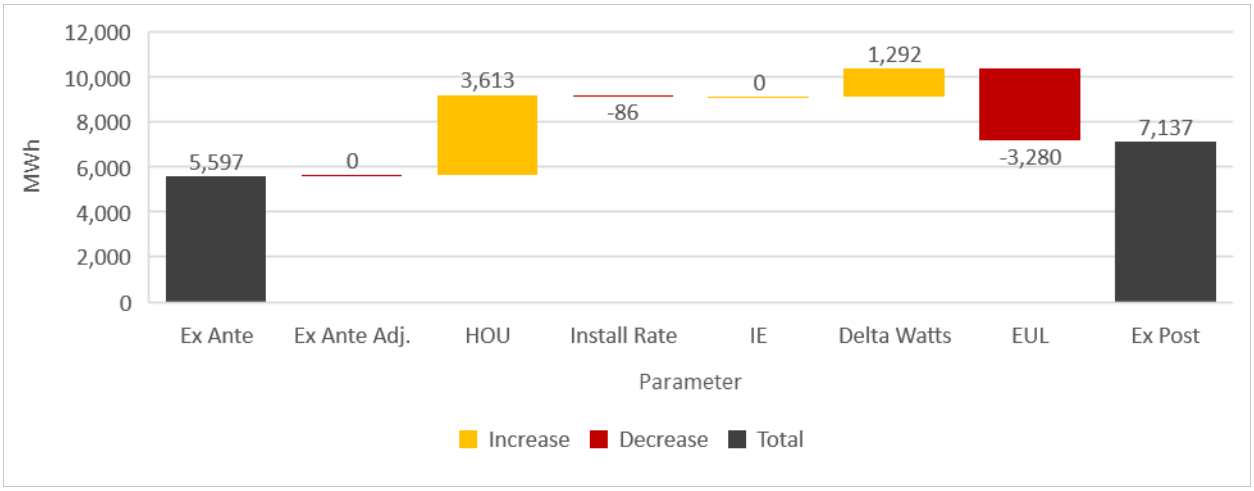
For SDG&E A-lamp measures, ex post hours of use (HOU) were greater (in aggregate) than the ex ante claim, which leads to a slight increase in the GRR. The evaluation team estimated an installation rate that was slightly lower than the ex ante claim, which reduces the GRR. The ex post delta wattage (the difference between the baseline and installed wattage) had the most significant impact on the GRR. Finally, the ex post EUL reduced the lifecycle GRR because the ex post HOU were higher.

FIGURE 5-15: PG&E LED DOWNLIGHT EX ANTE TO EX POST IMPACT WATERFALL



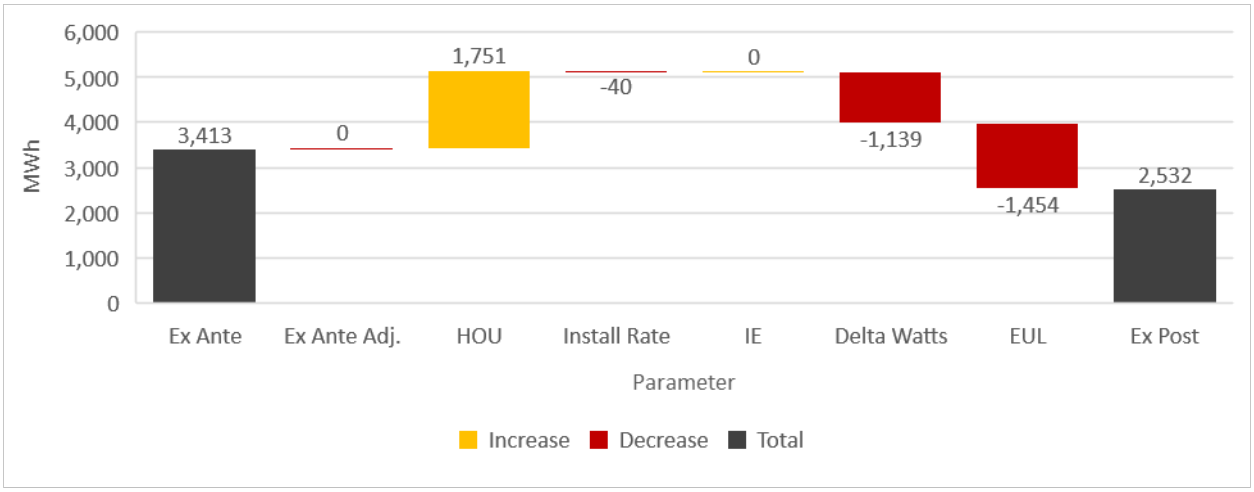
For PG&E downlight measures, the lifecycle GRR is much greater than one. This is driven by the ex post hours of use (HOU) being greater (in aggregate) than the ex ante claim. The evaluation team estimated an installation rate of 99% which was slightly lower than the ex ante claim. The ex post delta wattage (the difference between the baseline and installed wattage) increased the GRR as well. The evaluation team estimated WRRs for downlight measures that were greater than ex ante claims. Finally, the ex post EUL reduced the lifecycle GRR only slightly.

FIGURE 5-16: SCE LED DOWNLIGHT EX ANTE TO EX POST IMPACT WATERFALL



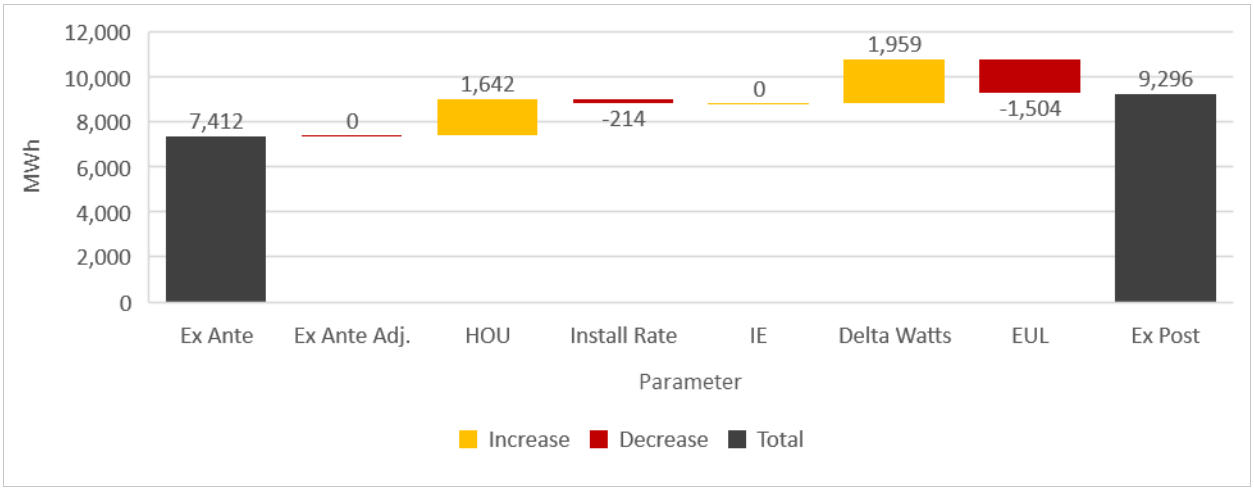
The lifecycle GRR for SCE downlight measures is greater than one. While the ex post hours of use (HOU) are greater (in aggregate) than the ex ante claim, the ex post EUL is less. This, combined with a higher ex post delta wattage, leads to an increased lifecycle GRR.

FIGURE 5-17: SDG&E LED DOWNLIGHT EX ANTE TO EX POST IMPACT WATERFALL



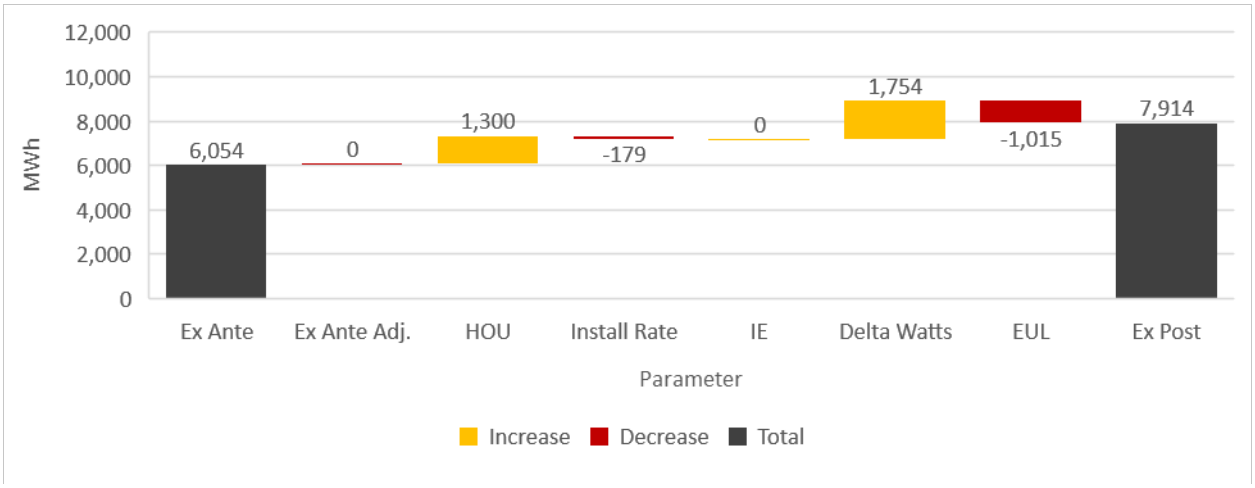
For SDG&E downlight measures, the lifecycle GRR is less than one. While the ex post hours of use (HOU) are greater (in aggregate) than the ex ante claim, the ex post EUL is less. This, combined with a lower ex post delta wattage, leads to a decreased lifecycle GRR.

FIGURE 5-18: PG&E LED MR-16 EX ANTE TO EX POST IMPACT WATERFALL



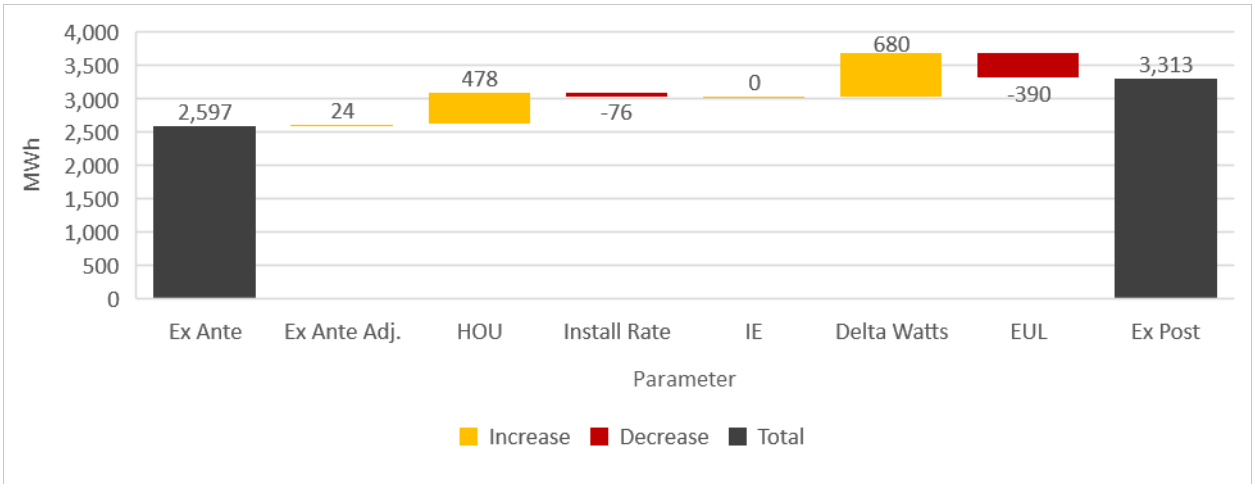
For PG&E MR-16 measures, both the first year and lifecycle GRR are greater than one. This is driven by the ex post hours of use (HOU) being greater (in aggregate) than the ex ante claim, along with the delta wattage. The evaluation team estimated WRRs for MR-16 measures that were higher than ex ante claims. The ex post EUL reduced the lifecycle GRR slightly.

FIGURE 5-19: SCE LED MR-16 EX ANTE TO EX POST IMPACT WATERFALL



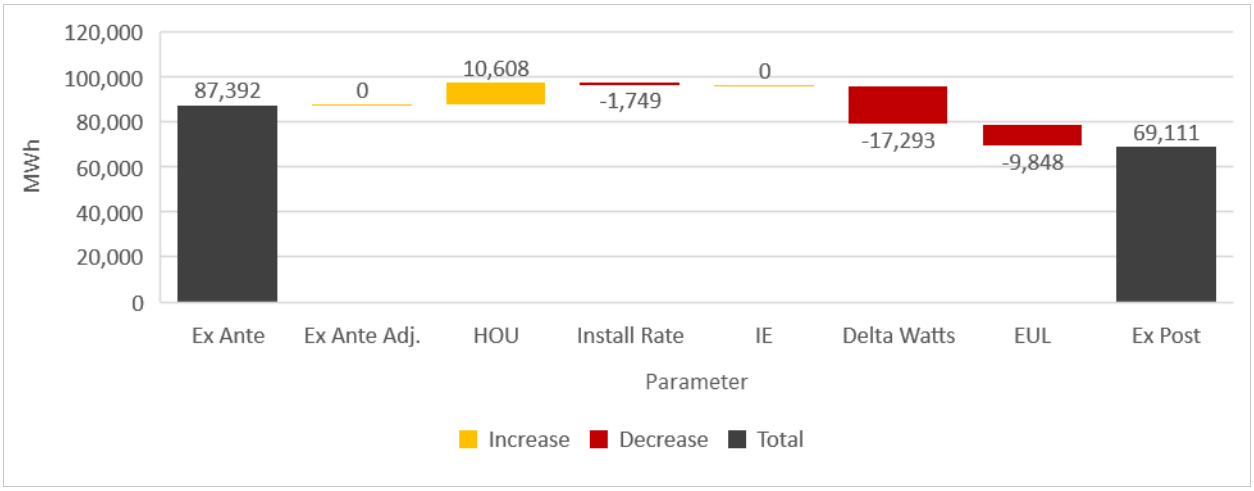
For SCE MR-16 measures, both the first year and lifecycle GRR are greater than one. This is driven by the ex post hours of use (HOU) being greater (in aggregate) than the ex ante claim, along with the delta wattage. The evaluation team estimated WRRs for MR-16 measures that were higher than ex ante claims. The ex post EUL reduced the lifecycle GRR slightly.

FIGURE 5-20: SDG&E LED MR-16 EX ANTE TO EX POST IMPACT WATERFALL



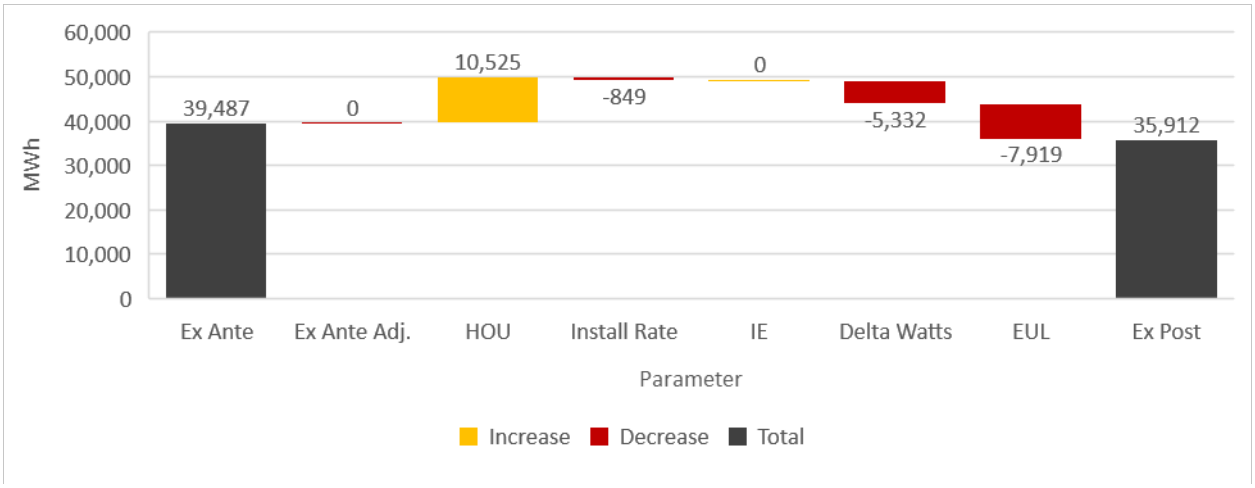
A similar pattern is found with SDG&E MR-16 measures – both the first year and lifecycle GRR are greater than one. This is driven again by the ex post hours of use (HOU) being greater (in aggregate) than the ex ante claim, along with the delta wattage. The evaluation team estimated WRRs for MR-16 measures that were higher than ex ante claims. The ex post EUL reduced the lifecycle GRR slightly.

FIGURE 5-21: PG&E LED REFLECTOR EX ANTE TO EX POST IMPACT WATERFALL



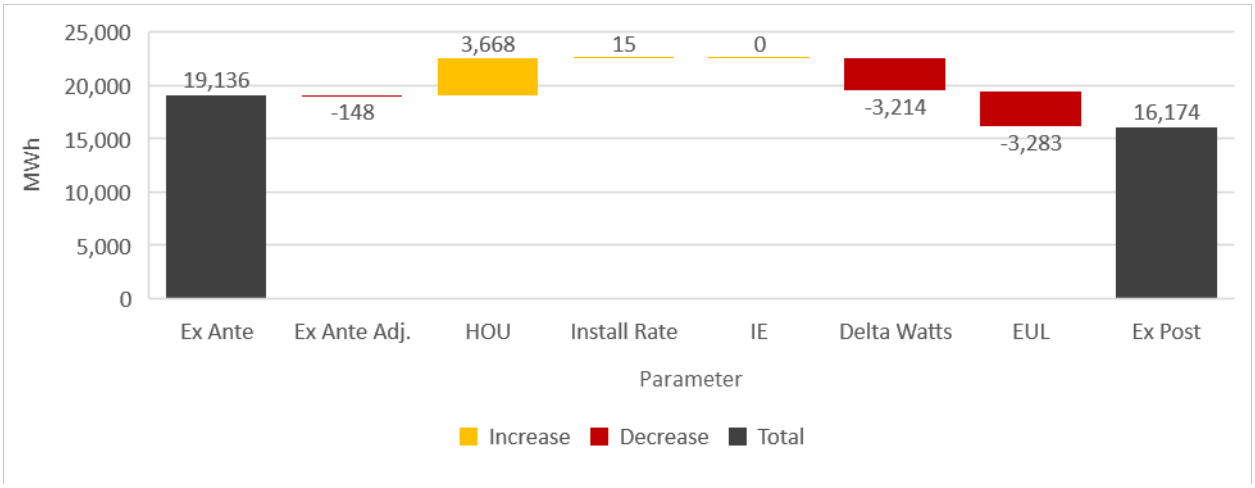
For PG&E reflector measures, the lifecycle GRR is less than one. While the ex post HOU are greater (in aggregate) than the ex ante claims, the ex post delta wattage is less. The evaluation team developed WRRs that were less than ex ante claims.

FIGURE 5-22: SCE LED REFLECTOR EX ANTE TO EX POST IMPACT WATERFALL



For SCE reflector measures, both the first year and lifecycle GRR are less than one. While the ex post HOU are greater (in aggregate) than the ex ante claims, the WRRs developed by the evaluation team are slightly less than the ex ante claims.

FIGURE 5-23: SDG&E LED REFLECTOR EX ANTE TO EX POST IMPACT WATERFALL



For SDG&E reflector measures, both the first year and lifecycle GRR are less than one. While the ex post HOU are greater (in aggregate) than the ex ante claims, the WRRs developed by the evaluation team are slightly less than the ex ante claims.

6 NET IMPACT ANALYSIS

The phone surveys that were conducted for this evaluation served not only to verify the installation of sampled measures and recruit for the on-site verification, but also to acquire information about the influence of the program on the purchase and installation of the measure. The questions asked of interviewees were designed to gather information that allowed the evaluation team to estimate participant free-ridership to support the development of net-to-gross ratios (NTGRs) and net savings values. A standard battery of NTG questions was asked of all phone survey respondents who purchased and installed different indoor and outdoor LED technologies. Below we discuss the methodology used to develop the NTGR and the results of that analysis.

6.1 NET IMPACT EVALUATION METHODOLOGY

Over the last several evaluation cycles, Net-to-Gross (NTG) analysis for nonresidential programs has used a standardized Self-Report Approach (SRA)[1] that is based on the results of self-report telephone surveys with program participants. This PY2017 evaluation continues use of this standard SRA framework with relatively minor modifications to NTG survey question batteries, and revisions to the NTG scoring algorithm based on specific recommendations from the 2013-2015 Program Performance Assessment of the Nonresidential Downstream Programs.[2] The most significant change to the NTG scoring algorithm is elimination of the PAI-1 score when calculating the NTG ratio. The evaluation team also considered modifying the NTG framework for this 2017 evaluation to incorporate a dual baseline NTG approach but decided to defer it to the 2018 evaluation cycle since there were very few measures in this cycle where the dual baseline approach applied. The evaluation team will continue to develop and refine the dual baseline framework using data collected in this cycle after this PY2017 evaluation is completed.

The net savings calculations for this evaluation follow the original methods, with the modifications noted.

6.1.1 Overview of Approach to Estimating Free Ridership

The methodology described in this section was developed to address the unique needs of nonresidential customer projects developed through energy efficiency programs offered by the four California IOUs and third-party implementers. The free ridership method used for this study relies exclusively on the standardized Self-Report Approach (SRA) to estimate project and domain-level net-to-gross ratios (NTGRs), since other available methods and research designs are generally not feasible. The SRA in this

[1] This SRA framework was originally developed by the statewide Nonresidential NTG working group during 2008.

[2] https://pda.energydataweb.com/api/view/1975/2013-2015%20Program%20Performance%20Assessment%20Of%20The%20Nonresidential%20Downstream%20Programs%20-%20Final.pdf

evaluation was implemented in accordance with the relevant EM&V guidelines including the California Energy Efficiency Evaluation Protocols (April 2006).

The SRA methodology used in this study 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 that were assigned weights. Respondents were asked 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 the real-world decision making and helped to ensure that all non-program influences were accounted for in assessing the unique contribution of the program to the energy efficiency project's implementation.

6.1.2 NTG Questions and Scoring Algorithm

Approach Used in Previous Evaluations

Historically, the NTGR has been calculated as an average of three scores. Each of these scores represents the highest response or the average of several responses given to one or more questions about the decision to install a program measure.

- **PAI-1** reflects the influence of the most important of various program and non-program elements in the customer's decision to select the specific program measure at this time. Program influence through vendor recommendations was also incorporated in this score. Note that Score PAI-1 took the highest program score divided by the sum of the maximum of the program and non-program scores.
- **PAI-2** captures the perceived importance of the program (whether incentive, recommendation, audit or other program intervention) relative to non-program factors in the decision to implement the specific measure that was eventually adopted or installed. This score was determined by asking respondents to assign importance values to both the program and most important non-program influences so that the two values total 10. The program influence score was reduced by half if respondents said they had already made their decision to install the specific program qualifying measure before they learned their project was eligible for program rebates.
- **PAI-3** captures the likelihood of various actions the customer might have taken at the time or project decision making, and in the future, if the program had not been available (the counterfactual). This score also accounts for deferred free ridership by incorporating the likelihood that the customer would have installed program-qualifying measures at a later date if the program had not been available.

When there are multiple questions that fed into the scoring algorithm, as is the case for Score PAI-1, the maximum value for program and non-program influences is always used. The rationale for using the maximum value is to capture the most important program and non-program elements in the participant's decision making. Thus, the score is always based on the strongest influence, whether program or non-program, indicated by the respondent. However, high scores that are inconsistent with other previous responses trigger consistency checks and lead to follow-up questions to clarify and resolve the discrepancy.

When there are missing data or 'don't knows' to critical elements of each score, one of two options are used. The most common approach, in cases where it was one of several other elements that are considered in the algorithm, is to simply exclude the missing element from consideration.

The resulting self-reported NTGR in most cases is simply the average of all three scores, divided by 10. The one exception to this is when the respondent indicated a 10 in 10 probability of installing the same equipment at the same time in the absence of the program, in which case the NTGR is based on the average of Scores 2 and 3 only.

Overview of Approach Used in 2017 Evaluation

This PY2017 evaluation has continued use of this standard SRA framework with certain changes, which were made based on specific recommendations from the 2013-2015 Program Performance Assessment:

The NTG scoring algorithm was revised. The only change was to eliminate the PAI-1 score from the calculation of the NTG ratio. PAI-1 was removed for two primary reasons:

1. **PAI-1 scores did not appear to be correlated with free ridership.** We compared the PAI-1 scores to other survey questions that would indicate a high likelihood for free ridership and did not see the PAI-1 scores correlate well to these metrics.
2. **The inclusion of the PAI-1 score biases the NTGR towards a value of 0.5.** The PAI-1 score tends to converge to a value of around 5. This is likely due to respondents rating at least one program and one non-program factor very highly, at least a 9. Averaging in the PAI-1 score with PAI-2 and PAI-3 will therefore move the NTGR towards a value of 0.5.

The analyses underlying these changes to the NTG algorithm are presented in the next section.

6.1.3 Analysis to Support Changes to NTG Algorithm

Issue 1: PAI-1 scores did not appear to be correlated with free ridership. We examined the relationship between PAI-1 and two survey questions that we felt were strong indications of free ridership:

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 program rebate?

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
2	Install standard efficiency equipment or whatever 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 is)
5	Done the same thing I would have done as I did through the program
6	Repair/rewind or overhaul the existing equipment
77	Something else (specify what _____)

For question N2, we would expect higher levels of free ridership to be associated with respondents stating they already made the decision to install their new equipment before they became aware of the program rebate, and that PAI-1 scores would be substantially lower for this response than the other two responses.

Table 6-1 provides a comparison of question N2 and the three PAI scores. Also shown is one additional question:

N41: 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?

This question is a component of the PAI-2 score, as is the N2 question. The PAI-2 score is equal to N41 and is divided in half if the N2 response is “before”. Because N2 is a component of PAI-2, it is obviously correlated with that response. Therefore, we are also presenting N41.

TABLE 6-1: COMPARISON OF PAI-1 SCORES WITH TIMING OF DECISION TO INSTALL EQUIPMENT

Timing of Decision Relative to Awareness of Rebate	PAI-1	PAI-2	PAI-3	N41
Before	4.87	2.78	1.77	5.56
Same Time	4.83	6.24	4.67	6.24
After	5.15	7.44	6.12	7.44

Our expectation is that we would see significant increases in the PAI and N41 scores as we move from Before to After. This is clearly the case for PAI-2, PAI-3 and N41. However, we see a decrease in PAI-1 as we move from N2 responses of Before to Same Time, and see very little increase between Before and After responses.

Another telling indication of program influence is the self-reported action that participants say they would have taken had the program not existed in question N6. Respondents were asked what they would have been most likely to do if the program had not been available. Two common responses were "done nothing and keep existing equipment as is", and "done the same thing I would have done as I did through the program". One would expect relatively high PAI scores for the "done nothing" and relatively low PAI scores for the "done the same thing" responses. As shown in the table below, PAI-1 had the lowest score for the "done nothing" response, significantly less than PAI-3 (5.12 versus 8.11), and PAI-1 had the smallest difference in scores between the "done the same thing" and "done nothing" responses (only a 0.49 difference compared to 5.67 for PAI-3).

TABLE 6-2: COMPARISON OF PAI-1 SCORES WITH NO-PROGRAM BEHAVIORS

Stated Action in Absence of the Program	PAI-1	PAI-2	PAI-3
Done nothing, keep existing equipment as is	5.12	6.48	8.11
Done the same thing I would have done as I did through the program	4.63	5.43	2.44

Issue 2: The inclusion of the PAI-1 score biases the NTGR towards a value of 0.5. Overall, we found the average PAI-1 score to be 4.9, with 80 percent of the individual scores within 0.5 of that mean (i.e., between 4.4 and 5.4). This is likely due to respondents rating at least one program and one non-program factor very high. We found that respondents rated at least one program factor a 9 or 10, 75 percent of the time, and at least one non-program factor a 9 or 10, 73 percent of the time. Furthermore, 60 percent of the time, the respondent's highest rated program and non-program factors were rated equally. Respondents are likely to score at least one program and one non-program influence very highly, leading most PAI-1 scores to fall near 4.9. This has the effect of biasing the NTGRs towards 0.5.

Table 6-3 provides a comparison of the NTGRs by PA and measure type with and without using PAI-1, along with the PAI-1 score. As show in the exhibit, the values of using PAI-1 are all closer to a value of 0.50 then without using it. Of the six PAI-1 scores, all but one are within approximately one half a point of 5.0. The only one outside this range also exhibited the highest NTGR score so is understandably higher than the rest, but including the PAI-1 still pulls the NTGR towards 0.50. Also note that the relative precision values are all lower using the PAI-1 score. This is because the PAI-1 score is pulling the values towards a more central mean and eliminating some of the variation in the scores.

TABLE 6-3: COMPARISON OF NTGRS WITH AND WITHOUT USING PAI-1

PA	Measure Type	Sites	NTGR Scores				
		n	Using PAI-1	RP	Without PAI-1	RP	PAI-1
PG&E	Indoor LED Fixtures	66	0.43	8%	0.39	13%	5.00
	Outdoor LED Fixtures	60	0.47	7%	0.47	10%	4.76
SCE	Indoor LED Fixtures	42	0.69	5%	0.79	6%	4.97
	Outdoor LED Fixtures	39	0.53	5%	0.55	7%	4.98
SDG&E	Indoor LED Fixtures	44	0.58	8%	0.64	11%	4.46
	Outdoor LED Fixtures	10	0.74	8%	0.81	9%	5.95

6.2 NET TO GROSS RESULTS

Table 6-4 presents the final ex post NTGR scores after eliminating the PAI-1 score, for indoor and outdoor LED fixtures by PA. Also presented are the ex ante NTG values as well as the average PAI-2 and PAI-3 scores for each segment. These data are weighted by ex ante lifecycle gross kWh. As discussed throughout the report, these estimates were developed for downstream-only measures (i.e., midstream programs were not evaluated as part of this evaluation). Furthermore, the evaluation team stratified the population of indoor LED fixtures based on the measure name associated with the claims in the tracking database, but the NTGs have been rolled up to the measure group level. Downlight measures, which are also classified as indoor LED fixtures, were not included in this analysis.

TABLE 6-4: EX ANTE AND EX POST NET-TO-GROSS RATIOS AND PAI SCORES FOR INDOOR AND OUTDOOR LED FIXTURE MEASURES BY LED TYPE

PA	Measure Type	Sites	NTG kWh			NTG Components	
		n	Ex Ante	Ex Post	RP	PAI-2	PAI-3
PG&E	Indoor LED Fixtures	66	0.62	0.39	13%	4.81	3.04
	Outdoor LED Fixtures	60	0.60	0.47	10%	5.59	3.66
SCE	Indoor LED Fixtures	42	0.67	0.79	6%	7.95	7.67
	Outdoor LED Fixtures	39	0.70	0.55	7%	5.50	5.60
SDG&E	Indoor LED Fixtures	44	0.66	0.64	11%	6.31	6.78
	Outdoor LED Fixtures	10	0.60	0.81	9%	7.53	8.59

6.2.1 PG&E Indoor and Outdoor LED Fixtures

- The ex post NTG ratios are less than the ex ante values for both PG&E LED measure types. In addition, ex post values for this 2017 evaluation (0.39 for Indoor LED fixtures and 0.47 for outdoor LED fixtures) are down significantly from the 2015 evaluation in which the overall ex post NTG ratio was 0.55.
- The overall PAI-2 scores of 4.81 for Indoor LED Fixtures and 5.59 for Outdoor LED Fixtures suggest, on average, that program participants perceived the importance of program related factors to be approximately the same as for non-program factors. In other words, given 10 points to allocate between program and non-program factors, participants allocated approximately the same number of points to program factors as to non-program factors. The PAI-3 scores (3.04 for Indoor LED fixtures and 3.66 for Outdoor LED fixtures) were not as favorable. Results for PAI-2 and PAI-3 at the project level were highly variable with values ranging from 0 to 10.
- Results for PG&E Indoor and Outdoor LED fixtures are also significantly lower than those for SCE and SDG&E. This is in part due to a number of PG&E participants stating that they had already made the decision to participate prior to becoming aware of the rebate, and also stating that they would have done the same action in the absence of the program.

  Table 6-5 presents the results of the N2 and N6 questions discussed above, by PA and Measure Type. For N2, we see that the PG&E participants were much more likely to have already made their decision to install the new equipment prior to becoming aware of the program rebate. Furthermore, significantly more PG&E participants reported they would have done the same thing in the absence of the program.

TABLE 6-5: TIMING OF DECISION AND SELF-REPORTED ACTION IN THE ABSENCE OF THE PROGRAM

PA	Measure Type	Sites	N2: Timing of Decision	N6: Action in Absence of Program
		n	Before Program Awareness	Do Same Thing
PG&E	Indoor LED Fixtures	66	55%	47%
	Outdoor LED Fixtures	60	24%	53%
SCE	Indoor LED Fixtures	42	3%	16%
	Outdoor LED Fixtures	39	15%	26%
SDG&E	Indoor LED Fixtures	44	10%	29%
	Outdoor LED Fixtures	10	4%	0%

It is not entirely clear why PG&E participants may have been more likely to have made their decision prior to becoming aware of the program or may have a higher likelihood of doing the same thing in the absence of the program. However, we do see some differences in the characteristics of the PG&E participants relative to SCE and SDG&E. As shown in Appendix D, question CC2A indicates that the PG&E participants have larger facilities on average than SCE and SDG&E. And, question FM050 shows that PG&E has a different distribution of business types, with significantly more agricultural green houses, industrial facilities and retail businesses among the indoor fixture participants; and more lodging, education and public assembly among the outdoor fixture participants. Therefore, some of the differences we see in the NTGR may be attributable to these differences in participant characteristics.

6.2.2 SCE Indoor and Outdoor LED Fixtures

- In general, these measures exhibited medium-high program influence with an average ex post NTG ratio of 0.79 for Indoor LED fixtures and 0.55 for Outdoor LED fixtures. The ex post NTG ratio for Indoor fixtures exceeds the ex ante value of 0.70, while the value for Outdoor fixtures falls short of the ex ante value of 0.70. Results are in line with the 2015 evaluation, in which an ex post NTG ratio of 0.63 was found.
- PAI-2 and PAI-3 scores provide some insight into these results.
  - For Indoor LED fixtures, the PAI-2 and PAI-3 score values were nearly identical (7.95 for PAI-2 and 7.67 for PAI-3). These are very consistent with the overall ex post NTG ratio of 0.79. PAI-2 scores at the project level were generally very strong, with two-thirds of respondents providing scores of 7 and above.
  - PAI-2 and PAI-3 results were not as favorable for Outdoor LED fixtures. PAI-2 and PAI-3 score values were 5.50 and 5.60, respectively. Project-level PAI-2 scores span a wide range, with values from 2 to 10, with half of respondents providing scores of 5 and below. The range for PAI-3 scores is even broader, with values from 0 to 10 and a high degree of variability in responses.

6.2.3 SDG&E Indoor and Outdoor LED Fixtures

- Ex post NTG results for these measure categories were favorable with NTG ratios of 0.64 for Indoor LED fixtures and 0.81 for Outdoor LED fixtures. The Indoor value is in line with the ex ante value of 0.64, while the Outdoor value exceeds the ex ante value of 0.60. Both results are consistent with the ex post NTGR from the 2015 evaluation of 0.67.
- PAI-2 and PAI-3 scores were generally very strong, and consistent. For both Indoor and Outdoor LED fixtures, the PAI-2 and PAI-3 score values were nearly identical (Indoor – 6.31 for PAI-2 and 6.78 for PAI-3; Outdoor – 7.53 for PAI-2 and 8.59 for PAI-3).
- Individual PAI-2 and PAI-3 scores for both measures generally ranged between 5 and 10, signifying strong program influence. One-third of the scores provided were scores of 8, 9 and 10.

7 EVALUATION RESULTS

This section of the report presents the gross and net realization rates the evaluation team developed for the 2017 deemed ESPI lighting measures discussed throughout the report. The evaluation team studied a subset of the measures within the PY2017 population of nonresidential deemed measures. Table 7-1 presents the four ESPI measures subject to ex post evaluation for PY2017 along with the measure types ultimately evaluated.

TABLE 7-1: DATA SOURCES AND EX POST UPDATE FOR PY2017 ESPI MEASURES

2017 ESPI Measure	Measure Type	Data Source		Ex Post Update	
		New Phone Surveys	Existing On-sites	NTG	Gross
LED Fixture	Downlight		X	Pass Through	X
	High/Non-Highbay	X		X	Pass Through
LED Lamp	A-Lamps		X	Pass Through	X
	Specialty Lamps			Pass Through	Pass Through
LED Reflector Lamp	MR-16		X	Pass Through	X
	Reflectors		X	Pass Through	X
Outdoor LED Fixture	Non-Street Light	X		X	Pass Through

7.1 GROSS FIRST YEAR REALIZATION RATES

The evaluation team estimated gross realization rates (GRR) by examining the ratio of the aggregate evaluated gross savings to the aggregated ex ante gross savings. The evaluation team utilized the following algorithm to develop GRRs:

$$Gross\_Realization\_Rate_m = \frac{\sum_{i,m=1}^{n} Gross\_Ex\_Post\_Impact_{i,m}}{\sum_{i,m=1}^{n} Gross\_Ex\_Ante\_Impact_{i,m}}$$

Where:

$Gross\_Ex\_Post\_Impact_{i,m}$ = the gross ex post impact estimate for $claim_i$ of $measure_m$ in the population.

$Gross\_Ex\_Ante\_Impact_{i,m}$ = the gross ex ante impact estimate $claim_i$ of $measure_m$ in the population.

Table 7-2 through Table 7-4 below present the population level first year gross MWh and MW realization rates for evaluated deemed ESPI lighting measures along with the aggregate ex ante and ex post first year MWh and MW savings for each IOU. Realization rates that are *italicized* signifies the ex ante savings were passed through.

TABLE 7-2: PG&E FIRST YEAR GROSS MWH AND MW REALIZATION RATES FOR EVALUATED MEASURES

2017 ESPI Measure	Measure Type	First Year Gross MWh Savings			First Year Gross MW Savings		
		Ex Ante	Ex Post	GRR	Ex Ante	Ex Post	GRR
LED Fixture	Downlight	1,300.9	2,286.2	**176%**	0.3	0.4	**159%**
	High/Non-Highbay	28,849.0	28,849.0	***100%***	6.9	6.9	***100%***
LED Lamp	A-Lamps	7,545.1	5,157.5	**68%**	1.5	0.9	**59%**
	Specialty Lamps	674.0	674.0	***100%***	0.1	0.1	***100%***
LED Reflector Lamp	MR-16	812.8	1,194.1	**147%**	0.2	0.3	**141%**
	Reflectors	9,653.0	8,674.0	**90%**	2.4	2.0	**86%**
Outdoor LED Fixture	Non-Street Light	25,436.7	25,436.7	***100%***	-	-	**-**

TABLE 7-3: SCE FIRST YEAR GROSS MWH AND MW REALIZATION RATES FOR EVALUATED MEASURES

2017 ESPI Measure	Measure Type	First Year Gross MWh Savings			First Year Gross MW Savings		
		Ex Ante	Ex Post	GRR	Ex Ante	Ex Post	GRR
LED Fixture	Downlight	608.4	1,211.6	**199%**	0.1	0.2	**172%**
	High/Non-Highbay	3,845.2	3,845.2	***100%***	1.3	1.3	***100%***
LED Lamp	A-Lamps	2,480.5	2,145.8	**87%**	0.5	0.4	**69%**
	Specialty Lamps	807.9	807.9	***100%***	0.2	0.2	***100%***
LED Reflector Lamp	MR-16	688.0	1,030.2	**150%**	0.2	0.3	**152%**
	Reflectors	4,303.1	4,775.4	**111%**	1.0	1.1	**103%**
Outdoor LED Fixture	Non-Street Light	13,357.1	13,357.1	***100%***	-	-	**-**

TABLE 7-4: SDG&E FIRST YEAR GROSS MWH AND MW REALIZATION RATES FOR EVALUATED MEASURES

2017 ESPI Measure	Measure Type	First Year Gross MWh Savings			First Year Gross MW Savings		
		Ex Ante	Ex Post	GRR	Ex Ante	Ex Post	GRR
LED Fixture	Downlight	327.4	395.2	**121%**	0.1	0.1	**74%**
	High/Non-Highbay	5,647.0	5,647.0	***100%***	1.3	1.3	***100%***
LED Lamp	A-Lamps	1,531.5	1,357.8	**89%**	0.3	0.2	**70%**
	Specialty Lamps	1,216.7	1,216.7	***100%***	0.2	0.2	***100%***
LED Reflector Lamp	MR-16	374.4	523.6	**140%**	0.1	0.1	**146%**
	Reflectors	2,593.1	2,553.7	**98%**	0.6	0.5	**96%**
Outdoor LED Fixture	Non-Street Light	849.9	849.9	***100%***	-	-	**-**

As discussed in Section 5.4, the first-year realization rates are influenced by differences in the underlying impact parameters – installation rates, operating hours, coincidence factors and installed/replaced wattages – from the ex ante claim to the ex post evaluation. Below is a brief discussion of those differences for each evaluated measure:

- Downlight
  - PG&E (176%) – The ex post delta wattages and the ex post operating hours were much higher than the ex ante claim.
  - SCE (199%) – Similar to PG&E, the ex post delta wattages and operating hours were greater than the ex ante claim.
  - SDG&E (121%) – The ex post operating hours were greater, but the ex post delta wattages were less than the ex ante claim.

- A-Lamps
  - PG&E (68%) – The ex post delta wattage was much less than the ex ante claim, along with a slightly lower ex post installation rate. HOU were comparable.
  - SCE (87%) – Lower ex post delta wattages had a more significant impact on the GRR than the increased ex post HOU.
  - SDG&E (89%) – The same as for SCE.

- MR-16
  - PG&E (147%) – Higher ex post operating hours and delta wattages lead to a GRR greater than 1.
  - SCE (150%) – The same as for PG&E.
  - SDG&E (140%) – The same as for PG&E and SCE.

- Reflector Lamps
  - PG&E (90%) – A slightly lower ex post installation rate and lower ex post delta wattage were more significant than the higher ex post operating hours.
  - SCE (111%) – Higher ex post operating hours, but a lower ex post delta wattage leads to GRR greater than 1.
  - SDG&E (98%) – Higher ex post operating hours, but a lower ex post delta wattage leads to a GRR almost equal to 1.

7.2 GROSS LIFECYCLE REALIZATION RATES

Table 7-5 through Table 7-7 present the population level gross lifecycle MWh and MW realization rates for the evaluated deemed ESPI lighting measures along with the aggregate ex ante and ex post lifecycle MWh and MW savings.

TABLE 7-5: PG&E LIFECYCLE GROSS MWH AND MW REALIZATION RATES FOR EVALUATED MEASURES

2017 ESPI Measure	Measure Type	Life Cycle Gross MWh Savings			Life Cycle Gross MW Savings		
		Ex Ante	Ex Post	GRR	Ex Ante	Ex Post	GRR
LED Fixture	Downlight	15,572.0	27,108.8	**174%**	3.2	5.1	**158%**
	High/Non-Highbay	339,720.9	339,720.9	***100%***	84.0	84.0	***100%***
LED Lamp	A-Lamps	76,139.0	47,063.8	**62%**	14.8	7.9	**53%**
	Specialty Lamps	4,618.6	4,618.6	***100%***	0.9	0.9	***100%***
LED Reflector Lamp	MR-16	7,412.1	9,295.6	**125%**	1.6	1.9	**120%**
	Reflectors	87,392.3	69,110.5	**79%**	21.3	16.2	**76%**
Outdoor LED Fixture	Non-Street Light	305,240.4	305,240.4	***100%***	-	-	**-**

TABLE 7-6: SCE LIFECYCLE GROSS MWH AND MW REALIZATION RATES FOR EVALUATED MEASURES

2017 ESPI Measure	Measure Type	Life Cycle Gross MWh Savings			Life Cycle Gross MW Savings		
		Ex Ante	Ex Post	GRR	Ex Ante	Ex Post	GRR
LED Fixture	Downlight	5,597.4	7,137.5	**128%**	1.2	1.4	**117%**
	High/Non-Highbay	23,170.2	23,170.2	***100%***	7.8	7.8	***100%***
LED Lamp	A-Lamps	25,045.0	19,965.7	**80%**	5.2	3.3	**64%**
	Specialty Lamps	6,716.2	6,716.2	***100%***	1.7	1.7	***100%***
LED Reflector Lamp	MR-16	6,053.5	7,913.6	**131%**	1.6	2.0	**129%**
	Reflectors	39,487.3	35,911.6	**91%**	9.8	8.2	**83%**
Outdoor LED Fixture	Non-Street Light	160,285.7	160,285.7	***100%***	-	-	**-**

TABLE 7-7: SDG&E LIFECYCLE GROSS MWH AND MW REALIZATION RATES FOR EVALUATED MEASURES

2017 ESPI Measure	Measure Type	Life Cycle Gross MWh Savings			Life Cycle Gross MW Savings		
		Ex Ante	Ex Post	GRR	Ex Ante	Ex Post	GRR
LED Fixture	Downlight	3,413.3	2,531.8	**74%**	0.9	0.4	**48%**
	High/Non-Highbay	43,932.2	43,932.2	***100%***	10.4	10.4	***100%***
LED Lamp	A-Lamps	12,095.3	10,055.6	**83%**	2.6	1.6	**62%**
	Specialty Lamps	7,061.1	7,061.1	***100%***	1.4	1.4	***100%***
LED Reflector Lamp	MR-16	2,597.2	3,313.4	**128%**	0.6	0.7	**128%**
	Reflectors	19,135.9	16,174.0	**85%**	4.3	3.4	**79%**
Outdoor LED Fixture	Non-Street Light	10,198.8	10,198.8	***100%***	-	-	**-**

The lifecycle GRRs for each of the evaluated measures are influenced by the effective useful life (EUL) of the measures. Higher ex post annual operating hours (at the measure level) will lead to a decrease in the ex post EUL.

7.3 NET FIRST YEAR REALIZATION RATES

The evaluation team estimated the net ex post impacts in a similar manner as the gross impacts, however, the NTG ratios were multiplied by the gross impacts. The resulting net realization rates (NRR) represent the ratio of aggregated evaluated net savings to the aggregated ex ante net savings. The evaluation team utilized the following formula to develop customer specific NRRs:

$$Net\_Realization\_Rate_m = \frac{\sum_{i,m=1}^{n} Net\_Ex\_Post\_Impact_{i,m}}{\sum_{i,m=1}^{n} Net\_Ex\_Ante\_Impact_{i,m}}$$

Where:

$Net\_Ex\_Post\_Impact_{i,m}$ = the net ex post impact estimate for $claim_i$ of $measure_m$ in the population

$Net\_Ex\_Ante\_Impact_{i,m}$ = the net ex ante impact estimate for $claim_i$ of $measure_m$ in the population

Table 7-8 below presents the population level first year MWh and MW net realization rates for the evaluated deemed ESPI lighting measures along with the aggregate ex ante and ex post first year net MWh and MW savings. The net realization rate is impacted by the difference in ex ante and ex post gross savings along with the differences between the ex ante and ex post NTG ratios.

TABLE 7-8: PG&E FIRST YEAR NET MWH AND MW REALIZATION RATES FOR EVALUATED MEASURES

2017 ESPI Measure	Measure Type	First Year Net MWh Savings			First Year Net MW Savings		
		Ex Ante	Ex Post	NRR	Ex Ante	Ex Post	NRR
LED Fixture	Downlight	845.7	1,486.2	**176%**	0.2	0.3	**159%**
	High/Non-Highbay	19,731.2	12,739.2	**65%**	4.8	3.3	**69%**
LED Lamp	A-Lamps	5,239.4	3,708.8	**71%**	1.0	0.6	**61%**
	Specialty Lamps	438.1	438.1	***100%***	0.1	0.1	***100%***
LED Reflector Lamp	MR-16	528.3	776.2	**147%**	0.1	0.2	**141%**
	Reflectors	7,224.9	6,603.3	**91%**	1.8	1.5	**87%**
Outdoor LED Fixture	Non-Street Light	16,610.3	13,190.0	**79%**	-	-	**-**

TABLE 7-9: SCE FIRST YEAR NET MWH AND MW REALIZATION RATES FOR EVALUATED MEASURES

2017 ESPI Measure	Measure Type	First Year Net MWh Savings			First Year Net MW Savings		
		Ex Ante	Ex Post	NRR	Ex Ante	Ex Post	NRR
LED Fixture	Downlight	395.9	788.1	**199%**	0.1	0.1	**172%**
	High/Non-Highbay	2,839.5	3,226.8	**114%**	0.9	1.1	**114%**
LED Lamp	A-Lamps	2,048.6	1,866.2	**91%**	0.4	0.3	**73%**
	Specialty Lamps	525.1	525.1	***100%***	0.1	0.1	***100%***
LED Reflector Lamp	MR-16	447.9	670.6	**150%**	0.1	0.2	**152%**
	Reflectors	3,738.7	4,187.7	**112%**	0.9	0.9	**104%**
Outdoor LED Fixture	Non-Street Light	10,138.4	8,033.0	**79%**	-	-	**-**

TABLE 7-10: SDG&E FIRST YEAR NET MWH AND MW REALIZATION RATES FOR EVALUATED MEASURES

2017 ESPI Measure	Measure Type	First Year Net MWh Savings			First Year Net MW Savings		
		Ex Ante	Ex Post	NRR	Ex Ante	Ex Post	NRR
LED Fixture	Downlight	250.8	296.4	**118%**	0.1	0.0	**76%**
	High/Non-Highbay	4,077.8	3,875.0	**95%**	1.0	0.9	**93%**
LED Lamp	A-Lamps	1,257.7	1,175.4	**93%**	0.3	0.2	**73%**
	Specialty Lamps	790.8	790.8	***100%***	0.2	0.2	***100%***
LED Reflector Lamp	MR-16	243.4	340.3	**140%**	0.1	0.1	**146%**
	Reflectors	2,088.5	2,096.0	**100%**	0.5	0.4	**96%**
Outdoor LED Fixture	Non-Street Light	552.4	727.5	**132%**	-	-	**-**

The evaluation team did not conduct any new primary data collection for LED lamp measures and downlighting, so the ex ante NTG ratios were passed through. For indoor and outdoor LED fixture measures, however, the evaluation team fielded self-report phone surveys to update NTG ratios and net savings values for these measures.[1] As discussed in Section 6 and presented below in Table 7-11, the ex post NTG ratios were different from the ex ante claim.

[1] This analysis was conducted only for downstream program participants. Midstream point-of-purchase programs were not included.

TABLE 7-11: EX ANTE AND EX POST NET-TO-GROSS RATIOS AND PAI SCORES FOR INDOOR AND OUTDOOR LED FIXTURE MEASURES BY LED TYPE

PA	Measure Type	Sites	NTG kWh			NTG Components	
		n	Ex Ante	Ex Post	RP	PAI-2	PAI-3
PG&E	Indoor LED Fixtures	66	0.62	0.39	13%	4.81	3.04
	Outdoor LED Fixtures	60	0.60	0.47	10%	5.59	3.66
SCE	Indoor LED Fixtures	42	0.67	0.79	6%	7.95	7.67
	Outdoor LED Fixtures	39	0.70	0.55	7%	5.50	5.60
SDG&E	Indoor LED Fixtures	44	0.66	0.64	11%	6.31	6.78
	Outdoor LED Fixtures	10	0.60	0.81	9%	7.53	8.59

While the gross savings were passed through for these measures (i.e., GRR = 100%), the net first year savings were updated with the NTG ratios developed from the phone survey. If the ex post NTG was less than the ex ante claim, the NRR is less than 100%, and vice versa.

7.4 NET LIFECYCLE REALIZATION RATES

Table 7-12 through Table 7-14 presents the population lifecycle MWh and MW net realization rates for the evaluated deemed ESPI lighting measures along with the aggregate ex ante and ex post lifecycle net MWh and MW savings.

TABLE 7-12: PG&E LIFECYCLE NET MWH AND MW REALIZATION RATES FOR EVALUATED MEASURES

2017 ESPI Measure	Measure Type	Life Cycle Net MWh Savings			Life Cycle Net MW Savings		
		Ex Ante	Ex Post	NRR	Ex Ante	Ex Post	NRR
LED Fixture	Downlight	10,123.9	17,623.6	**174%**	2.1	3.3	**158%**
	High/Non-Highbay	235,637.8	150,014.3	**64%**	58.6	39.8	**68%**
LED Lamp	A-Lamps	52,737.0	33,787.7	**64%**	10.3	5.7	**55%**
	Specialty Lamps	3,002.1	3,002.1	***100%***	0.6	0.6	***100%***
LED Reflector Lamp	MR-16	4,817.9	6,042.1	**125%**	1.0	1.3	**120%**
	Reflectors	65,175.4	52,354.8	**80%**	15.9	12.2	**77%**
Outdoor LED Fixture	Non-Street Light	199,323.1	158,279.7	**79%**	-	-	**-**

TABLE 7-13: SCE LIFECYCLE NET MWH AND MW REALIZATION RATES FOR EVALUATED MEASURES

2017 ESPI Measure	Measure Type	Life Cycle Net MWh Savings			Life Cycle Net MW Savings		
		Ex Ante	Ex Post	NRR	Ex Ante	Ex Post	NRR
LED Fixture	Downlight	3,643.7	4,645.9	**128%**	0.8	0.9	**117%**
	High/Non-Highbay	16,844.1	19,443.5	**115%**	5.7	6.6	**116%**
LED Lamp	A-Lamps	20,713.1	17,354.2	**84%**	4.3	2.9	**67%**
	Specialty Lamps	4,365.5	4,365.5	***100%***	1.1	1.1	***100%***
LED Reflector Lamp	MR-16	3,942.8	5,155.4	**131%**	1.0	1.3	**129%**
	Reflectors	34,241.1	31,392.0	**92%**	8.5	7.1	**84%**
Outdoor LED Fixture	Non-Street Light	121,661.3	96,395.5	**79%**	-	-	**-**

TABLE 7-14: SDG&E LIFECYCLE NET MWH AND MW REALIZATION RATES FOR EVALUATED MEASURES

2017 ESPI Measure	Measure Type	Life Cycle Net MWh Savings			Life Cycle Net MW Savings		
		Ex Ante	Ex Post	NRR	Ex Ante	Ex Post	NRR
LED Fixture	Downlight	2,630.8	1,996.5	**76%**	0.7	0.3	**51%**
	High/Non-Highbay	31,073.3	30,146.9	**97%**	7.4	7.0	**95%**
LED Lamp	A-Lamps	10,112.3	8,823.8	**87%**	2.2	1.4	**64%**
	Specialty Lamps	4,589.7	4,589.7	***100%***	0.9	0.9	***100%***
LED Reflector Lamp	MR-16	1,688.2	2,153.7	**128%**	0.4	0.5	**128%**
	Reflectors	15,781.8	13,456.5	**85%**	3.6	2.8	**79%**
Outdoor LED Fixture	Non-Street Light	6,629.2	8,730.4	**132%**	-	-	**-**

8 CONCLUSIONS AND RECOMMENDATIONS

This section of the report provides conclusions and recommendations related to the findings that were developed from this evaluation.

Conclusion 1a [Section 5]: The evaluation team found the ex post operating hours for certain measure types (like downlighting) were significantly higher than ex ante assumptions. While there were measurable differences between ex ante and ex post operating hours for each technology type, downlight kits were generally installed in high usage areas like lobbies and hallways that can operate at or near to 8,760 hours and the differences between ex ante and ex post were quite dramatic.

Conclusion 1b [Section 3]: Many sampled nonresidential facilities were on energy management systems (EMS) and LED technologies are exhibiting more sophisticated dimming and communication capabilities. The evaluation team verified a greater percentage of nonresidential sites that operated on EMS schedules compared to prior evaluations. The operation of these schedules along with the advanced dimming capabilities associated with retrofit equipment can have a significant impact on the load profiles for these sites and measures.

Recommendation 1: Based on the above two conclusions, future evaluations should consider conducting a large-scale monitoring study, especially for technologies like LED downlights and reflector lamps installed in high usage areas. The annual operation of these technologies can have potentially significant impacts on realized energy and demand savings moving forward. Furthermore, the presence of EMS and advanced dimming capabilities, along with the fact that these technologies are generally recessed into the ceiling, suggest that monitoring studies should consider alternative monitoring techniques (like panel metering and other connected devices) to augment traditional photocell logging techniques. The study should be conducted by technology and building type to capture differences across building type within a given technology.

Conclusion 2 [Section 5]: The average replaced wattages for screw-in LED A-lamps continue to decrease relative to prior evaluations. More research is needed for reflector and downlight measures. The evaluation team continued to verify the increased percentage of lower wattage CFLs in the baseline for A-lamp technologies. Again, these data represented a sample of program participants from 2014-2015, so it's feasible that, in the subsequent two program years, that distribution has increased. Furthermore, it's possible that like-for-like replacement of earlier generation LED technologies may further reduce savings impacts. Reflector lamps and downlighting, however, continue to have a significant share of halogen in the baseline.

Recommendation 2: While ex ante savings claims move away from a dependence on lamp wattages and continue moving toward savings based on EISA wattages and lamp efficacy, future evaluations

should continue to track and verify (where possible) the replaced/baseline wattage of all LED measure installations to determine, for LED A-Lamps, if the percentage of CFLs/LEDs in the baseline continues to grow, and for reflector lamps and downlighting, if there are any significant changes in the distribution of baseline technologies moving forward.

Conclusion 3 [Appendix D]: A not insignificant percentage of program participants installing LED fixture measures self-reported metal halide (MH), mercury vapor (MV) and high-pressure sodium (HPS) as the baseline technology replaced as part of the retrofit – especially for outdoor LED fixture measures.

Recommendation 3: Further research should be conducted to continue to track the typical baseline and efficiency of equipment replaced with program rebated LED indoor and outdoor technologies.

Conclusion 4 [Appendix D]: A significant percentage of program participants installing LED fixtures self-reported the condition of the pre-existing equipment in NOT poor condition and/or that the program influenced them to retrofit the equipment prior to the burn-out or failure of the existing equipment.

Recommendation 4: Future studies and programs should consider a framework to recognize the age of the existing equipment and the likelihood that a program participant would have either 1) deferred installation and maintained or continually repaired their existing system or 2) installed equipment that was no more efficient than code at the time they did, in the absence of the program.

Conclusion 5 [Over-arching]: When comparing ex ante parameter estimates to ex post results, not all documentation could be found detailing the specific parameters comprised of the ex ante claimed savings values. This caused unnecessary coordination with the PAs to find missing workpapers.

Recommendation 5: All workpaper documentation (workbook calculations and supporting documents) should be posted on the workpaper project archive (WPA) at www.deeresources.info.

Conclusion 6 [Over-arching]: The evaluation team sometimes found that the expected parameter values used in the ex ante savings claims were not based on the reported ex ante IDs.

Recommendation 6: Ex ante IDs should match with parameters used in the *actual* reported ex ante savings.

Conclusion 7 [Over-arching]: The evaluation team found a significant percentage of claims and associated energy/demand savings used the "COM" building type designation in PG&E.

Recommendation 7: For ex ante HOU and CDF, the "COM" building type should be avoided and only used when necessary.

APPENDIX AA STANDARDIZED HIGH LEVEL SAVINGS

Gross Lifecycle Savings (MWh)

PA	Standard Report Group	Ex-Ante Gross	Ex-Post Gross	GRR	% Ex-Ante Gross Pass Through	Eval GRR
PGE	LIGHTING INDOOR LED FIXTURE	355,293	366,830	1.03	95.6%	1.74
PGE	LIGHTING INDOOR LED LAMP	80,758	51,682	0.64	5.7%	0.62
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	94,804	78,406	0.83	0.0%	0.83
PGE	LIGHTING OUTDOOR LED FIXTURE	305,240	305,240	1.00	100.0%	
PGE	**Total**	**836,095**	**802,159**	**0.96**	**77.7%**	**0.82**
SCE	LIGHTING INDOOR LED FIXTURE	236,818	238,358	1.01	97.6%	1.28
SCE	LIGHTING INDOOR LED LAMP	31,761	26,682	0.84	21.1%	0.80
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	45,541	43,825	0.96	0.0%	0.96
SCE	LIGHTING OUTDOOR LED FIXTURE	160,286	160,286	1.00	100.0%	
SCE	**Total**	**474,406**	**469,151**	**0.99**	**83.9%**	**0.93**
SDGE	LIGHTING INDOOR LED FIXTURE	57,419	56,537	0.98	94.1%	0.74
SDGE	LIGHTING INDOOR LED LAMP	19,156	17,117	0.89	36.9%	0.83
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	21,733	19,487	0.90	0.0%	0.90
SDGE	LIGHTING OUTDOOR LED FIXTURE	10,199	10,199	1.00	100.0%	
SDGE	**Total**	**108,507**	**103,340**	**0.95**	**65.7%**	**0.86**
	Statewide	***1,419,008***	***1,374,650***	***0.97***	***78.9%***	***0.85***

Net Lifecycle Savings (MWh)

PA	Standard Report Group	Ex-Ante Net	Ex-Post Net	NRR	% Ex-Ante Net Pass Through	Ex-Ante NTG	Ex-Post NTG	Eval Ex-Ante NTG	Eval Ex-Post NTG
PGE	LIGHTING INDOOR LED FIXTURE	245,762	167,638	0.68	4.1%	0.69	0.46	0.69	0.44
PGE	LIGHTING INDOOR LED LAMP	55,739	36,790	0.66	100.0%	0.69	0.71		
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	69,993	58,397	0.83	100.0%	0.74	0.74		
PGE	LIGHTING OUTDOOR LED FIXTURE	199,323	158,280	0.79	0.0%	0.65	0.52	0.65	0.52
PGE	**Total**	**570,817**	**421,104**	**0.74**	**23.8%**	**0.68**	**0.52**	**0.67**	**0.48**
SCE	LIGHTING INDOOR LED FIXTURE	162,914	166,516	1.02	89.7%	0.69	0.70	0.73	0.84
SCE	LIGHTING INDOOR LED LAMP	25,079	21,720	0.87	100.0%	0.79	0.81		
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	38,184	36,547	0.96	100.0%	0.84	0.83		
SCE	LIGHTING OUTDOOR LED FIXTURE	121,661	96,396	0.79	0.0%	0.76	0.60	0.76	0.60
SCE	**Total**	**347,838**	**321,179**	**0.92**	**60.2%**	**0.73**	**0.68**	**0.75**	**0.63**
SDGE	LIGHTING INDOOR LED FIXTURE	41,259	39,698	0.96	24.7%	0.72	0.70	0.71	0.69
SDGE	LIGHTING INDOOR LED LAMP	14,702	13,413	0.91	100.0%	0.77	0.78		
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	17,470	15,610	0.89	100.0%	0.80	0.80		
SDGE	LIGHTING OUTDOOR LED FIXTURE	6,629	8,730	1.32	0.0%	0.65	0.86	0.65	0.86
SDGE	**Total**	**80,060**	**77,452**	**0.97**	**52.9%**	**0.74**	**0.75**	**0.70**	**0.72**
	Statewide	***998,716***	***819,735***	***0.82***	***38.8%***	***0.70***	***0.60***	***0.69***	***0.52***

Gross Lifecycle Savings (MW)

PA	Standard Report Group	Ex-Ante Gross	Ex-Post Gross	GRR	% Ex-Ante Gross Pass Through	Eval GRR
PGE	LIGHTING INDOOR LED FIXTURE	87.3	89.1	1.02	96.3%	1.58
PGE	LIGHTING INDOOR LED LAMP	15.7	8.8	0.56	5.9%	0.53
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	22.9	18.1	0.79	0.0%	0.79
PGE	LIGHTING OUTDOOR LED FIXTURE	0.0	0.0			
PGE	**Total**	**125.9**	**116.1**	**0.92**	**67.5%**	**0.76**
SCE	LIGHTING INDOOR LED FIXTURE	71.8	72.0	1.00	98.3%	1.17
SCE	LIGHTING INDOOR LED LAMP	6.9	5.0	0.73	24.5%	0.64
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	11.4	10.2	0.90	0.0%	0.90
SCE	LIGHTING OUTDOOR LED FIXTURE	0.0	0.0			
SCE	**Total**	**90.1**	**87.2**	**0.97**	**80.2%**	**0.84**
SDGE	LIGHTING INDOOR LED FIXTURE	13.7	13.3	0.97	93.6%	0.48
SDGE	LIGHTING INDOOR LED LAMP	4.0	3.0	0.76	35.3%	0.62
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	4.9	4.1	0.85	0.0%	0.85
SDGE	LIGHTING OUTDOOR LED FIXTURE	0.0	0.0			
SDGE	**Total**	**22.6**	**20.4**	**0.90**	**63.1%**	**0.74**
	Statewide	***238.6***	***223.7***	***0.94***	***71.9%***	***0.78***

Net Lifecycle Savings (MW)

PA	Standard Report Group	Ex-Ante Net	Ex-Post Net	NRR	% Ex-Ante Net Pass Through	Ex-Ante NTG	Ex-Post NTG	Eval Ex-Ante NTG	Eval Ex-Post NTG
PGE	LIGHTING INDOOR LED FIXTURE	60.7	43.1	0.71	3.5%	0.70	0.48	0.70	0.47
PGE	LIGHTING INDOOR LED LAMP	10.9	6.3	0.58	100.0%	0.69	0.71		
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	16.9	13.5	0.80	100.0%	0.74	0.74		
PGE	LIGHTING OUTDOOR LED FIXTURE	0.0	0.0						
PGE	**Total**	**88.5**	**62.9**	**0.71**	**33.8%**	**0.70**	**0.54**	**0.70**	**0.47**
SCE	LIGHTING INDOOR LED FIXTURE	49.4	50.5	1.02	88.5%	0.69	0.70	0.73	0.84
SCE	LIGHTING INDOOR LED LAMP	5.4	4.0	0.74	100.0%	0.78	0.79		
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	9.5	8.4	0.89	100.0%	0.83	0.83		
SCE	LIGHTING OUTDOOR LED FIXTURE	0.0	0.0						
SCE	**Total**	**64.3**	**62.9**	**0.98**	**91.2%**	**0.71**	**0.72**	**0.73**	**0.84**
SDGE	LIGHTING INDOOR LED FIXTURE	9.9	9.2	0.93	25.4%	0.72	0.69	0.71	0.68
SDGE	LIGHTING INDOOR LED LAMP	3.1	2.3	0.75	100.0%	0.77	0.76		
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	3.9	3.3	0.83	100.0%	0.81	0.80		
SDGE	LIGHTING OUTDOOR LED FIXTURE	0.0	0.0						
SDGE	**Total**	**16.9**	**14.8**	**0.87**	**56.4%**	**0.75**	**0.72**	**0.71**	**0.68**
	Statewide	***169.7***	***140.6***	***0.83***	***57.8%***	***0.71***	***0.63***	***0.70***	***0.52***

Gross Lifecycle Savings (MTherms)

PA	Standard Report Group	Ex-Ante Gross	Ex-Post Gross	GRR	% Ex-Ante Gross Pass Through	Eval GRR
PGE	LIGHTING INDOOR LED FIXTURE	-2,400	-2,452	1.02	96.0%	1.54
PGE	LIGHTING INDOOR LED LAMP	-420	-272	0.65	6.7%	0.62
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	-428	-355	0.83	0.0%	0.83
PGE	LIGHTING OUTDOOR LED FIXTURE	0	0			
PGE	**Total**	**-3,248**	**-3,079**	**0.95**	**71.8%**	**0.82**
SCE	LIGHTING INDOOR LED FIXTURE	-637	-640	1.00	98.3%	1.25
SCE	LIGHTING INDOOR LED LAMP	-76	-65	0.85	20.7%	0.81
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	-102	-97	0.95	0.0%	0.95
SCE	LIGHTING OUTDOOR LED FIXTURE	0	0			
SCE	**Total**	**-815**	**-802**	**0.98**	**78.7%**	**0.92**
SDGE	LIGHTING INDOOR LED FIXTURE	-608	-605	1.00	98.3%	0.78
SDGE	LIGHTING INDOOR LED LAMP	-64	-58	0.91	36.9%	0.85
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	-66	-59	0.88	0.0%	0.88
SDGE	LIGHTING OUTDOOR LED FIXTURE	0	0			
SDGE	**Total**	**-738**	**-722**	**0.98**	**84.2%**	**0.86**
	Statewide	***-4,800***	***-4,602***	***0.96***	***74.9%***	***0.84***

Net Lifecycle Savings (MTherms)

PA	Standard Report Group	Ex-Ante Net	Ex-Post Net	NRR	% Ex-Ante Net Pass Through	Ex-Ante NTG	Ex-Post NTG	Eval Ex-Ante NTG	Eval Ex-Post NTG
PGE	LIGHTING INDOOR LED FIXTURE	-1,659	-1,113	0.67	3.8%	0.69	0.45	0.69	0.44
PGE	LIGHTING INDOOR LED LAMP	-291	-195	0.67	100.0%	0.69	0.72		
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	-326	-272	0.84	100.0%	0.76	0.77		
PGE	LIGHTING OUTDOOR LED FIXTURE	0	0						
PGE	**Total**	**-2,276**	**-1,581**	**0.69**	**29.8%**	**0.70**	**0.51**	**0.69**	**0.44**
SCE	LIGHTING INDOOR LED FIXTURE	-442	-447	1.01	94.6%	0.69	0.70	0.74	0.84
SCE	LIGHTING INDOOR LED LAMP	-61	-53	0.88	100.0%	0.80	0.82		
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	-86	-81	0.95	100.0%	0.84	0.84		
SCE	LIGHTING OUTDOOR LED FIXTURE	0	0						
SCE	**Total**	**-589**	**-581**	**0.99**	**96.0%**	**0.72**	**0.73**	**0.74**	**0.84**
SDGE	LIGHTING INDOOR LED FIXTURE	-452	-422	0.94	18.2%	0.74	0.70	0.74	0.69
SDGE	LIGHTING INDOOR LED LAMP	-49	-45	0.93	100.0%	0.77	0.79		
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	-53	-47	0.88	100.0%	0.80	0.80		
SDGE	LIGHTING OUTDOOR LED FIXTURE	0	0						
SDGE	**Total**	**-553**	**-514**	**0.93**	**33.2%**	**0.75**	**0.71**	**0.74**	**0.69**
	Statewide	***-3,418***	***-2,676***	***0.78***	***41.8%***	***0.71***	***0.58***	***0.70***	***0.49***

Gross First Year Savings (MWh)

PA	Standard Report Group	Ex-Ante Gross	Ex-Post Gross	GRR	% Ex-Ante Gross Pass Through	Eval GRR
PGE	LIGHTING INDOOR LED FIXTURE	30,150	31,135	1.03	95.7%	1.76
PGE	LIGHTING INDOOR LED LAMP	8,219	5,832	0.71	8.2%	0.68
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	10,466	9,868	0.94	0.0%	0.94
PGE	LIGHTING OUTDOOR LED FIXTURE	25,437	25,437	1.00	100.0%	
PGE	**Total**	**74,271**	**72,271**	**0.97**	**74.0%**	**0.90**
SCE	LIGHTING INDOOR LED FIXTURE	28,225	28,828	1.02	97.8%	1.99
SCE	LIGHTING INDOOR LED LAMP	3,288	2,954	0.90	24.6%	0.87
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	4,991	5,806	1.16	0.0%	1.16
SCE	LIGHTING OUTDOOR LED FIXTURE	13,357	13,357	1.00	100.0%	
SCE	**Total**	**49,862**	**50,945**	**1.02**	**83.8%**	**1.13**
SDGE	LIGHTING INDOOR LED FIXTURE	7,989	8,057	1.01	95.9%	1.21
SDGE	LIGHTING INDOOR LED LAMP	2,748	2,575	0.94	44.3%	0.89
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	2,967	3,077	1.04	0.0%	1.04
SDGE	LIGHTING OUTDOOR LED FIXTURE	850	850	1.00	100.0%	
SDGE	**Total**	**14,555**	**14,559**	**1.00**	**66.8%**	**1.00**
	Statewide	***138,688***	***137,775***	***0.99***	***76.8%***	***0.97***

Net First Year Savings (MWh)

PA	Standard Report Group	Ex-Ante Net	Ex-Post Net	NRR	% Ex-Ante Net Pass Through	Ex-Ante NTG	Ex-Post NTG	Eval Ex-Ante NTG	Eval Ex-Post NTG
PGE	LIGHTING INDOOR LED FIXTURE	20,577	14,225	0.69	4.1%	0.68	0.46	0.68	0.44
PGE	LIGHTING INDOOR LED LAMP	5,678	4,147	0.73	100.0%	0.69	0.71		
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	7,753	7,379	0.95	100.0%	0.74	0.75		
PGE	LIGHTING OUTDOOR LED FIXTURE	16,610	13,190	0.79	0.0%	0.65	0.52	0.65	0.52
PGE	**Total**	**50,618**	**38,942**	**0.77**	**28.2%**	**0.68**	**0.54**	**0.67**	**0.48**
SCE	LIGHTING INDOOR LED FIXTURE	20,084	20,864	1.04	85.9%	0.71	0.72	0.74	0.84
SCE	LIGHTING INDOOR LED LAMP	2,574	2,391	0.93	100.0%	0.78	0.81		
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	4,187	4,858	1.16	100.0%	0.84	0.84		
SCE	LIGHTING OUTDOOR LED FIXTURE	10,138	8,033	0.79	0.0%	0.76	0.60	0.76	0.60
SCE	**Total**	**36,983**	**36,146**	**0.98**	**64.9%**	**0.74**	**0.71**	**0.75**	**0.65**
SDGE	LIGHTING INDOOR LED FIXTURE	5,840	5,683	0.97	30.2%	0.73	0.71	0.72	0.69
SDGE	LIGHTING INDOOR LED LAMP	2,049	1,966	0.96	100.0%	0.75	0.76		
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	2,332	2,436	1.04	100.0%	0.79	0.79		
SDGE	LIGHTING OUTDOOR LED FIXTURE	552	728	1.32	0.0%	0.65	0.86	0.65	0.86
SDGE	**Total**	**10,773**	**10,813**	**1.00**	**57.0%**	**0.74**	**0.74**	**0.71**	**0.71**
	Statewide	***98,373***	***85,901***	***0.87***	***45.2%***	***0.71***	***0.62***	***0.69***	***0.54***

Gross First Year Savings (MW)

PA	Standard Report Group	Ex-Ante Gross	Ex-Post Gross	GRR	% Ex-Ante Gross Pass Through	Eval GRR
PGE	LIGHTING INDOOR LED FIXTURE	7.2	7.4	1.02	96.2%	1.59
PGE	LIGHTING INDOOR LED LAMP	1.6	1.0	0.62	8.3%	0.59
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	2.5	2.3	0.90	0.0%	0.90
PGE	LIGHTING OUTDOOR LED FIXTURE	0.0	0.0			
PGE	**Total**	**11.4**	**10.7**	**0.94**	**62.1%**	**0.83**
SCE	LIGHTING INDOOR LED FIXTURE	8.5	8.6	1.01	98.4%	1.72
SCE	LIGHTING INDOOR LED LAMP	0.7	0.5	0.78	27.3%	0.69
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	1.2	1.3	1.10	0.0%	1.10
SCE	LIGHTING OUTDOOR LED FIXTURE	0.0	0.0			
SCE	**Total**	**10.4**	**10.5**	**1.01**	**82.1%**	**1.03**
SDGE	LIGHTING INDOOR LED FIXTURE	1.9	1.9	0.99	95.7%	0.74
SDGE	LIGHTING INDOOR LED LAMP	0.6	0.5	0.83	42.7%	0.70
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	0.6	0.7	1.02	0.0%	1.02
SDGE	LIGHTING OUTDOOR LED FIXTURE	0.0	0.0			
SDGE	**Total**	**3.1**	**3.0**	**0.97**	**66.5%**	**0.90**
	Statewide	***24.9***	***24.1***	***0.97***	***71.0%***	***0.89***

Net First Year Savings (MW)

PA	Standard Report Group	Ex-Ante Net	Ex-Post Net	NRR	% Ex-Ante Net Pass Through	Ex-Ante NTG	Ex-Post NTG	Eval Ex-Ante NTG	Eval Ex-Post NTG
PGE	LIGHTING INDOOR LED FIXTURE	4.9	3.6	0.72	3.6%	0.69	0.48	0.69	0.47
PGE	LIGHTING INDOOR LED LAMP	1.1	0.7	0.64	100.0%	0.69	0.71		
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	1.9	1.7	0.90	100.0%	0.74	0.75		
PGE	LIGHTING OUTDOOR LED FIXTURE	0.0	0.0						
PGE	**Total**	**7.9**	**6.0**	**0.75**	**40.1%**	**0.70**	**0.56**	**0.69**	**0.47**
SCE	LIGHTING INDOOR LED FIXTURE	6.0	6.2	1.03	84.4%	0.71	0.73	0.74	0.84
SCE	LIGHTING INDOOR LED LAMP	0.5	0.4	0.79	100.0%	0.77	0.79		
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	1.0	1.1	1.10	100.0%	0.83	0.83		
SCE	LIGHTING OUTDOOR LED FIXTURE	0.0	0.0						
SCE	**Total**	**7.6**	**7.8**	**1.02**	**87.6%**	**0.73**	**0.74**	**0.74**	**0.84**
SDGE	LIGHTING INDOOR LED FIXTURE	1.4	1.3	0.94	30.6%	0.73	0.70	0.72	0.68
SDGE	LIGHTING INDOOR LED LAMP	0.4	0.3	0.83	100.0%	0.75	0.75		
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	0.5	0.5	1.01	100.0%	0.80	0.79		
SDGE	LIGHTING OUTDOOR LED FIXTURE	0.0	0.0						
SDGE	**Total**	**2.3**	**2.2**	**0.94**	**58.3%**	**0.75**	**0.73**	**0.72**	**0.68**
	Statewide	***17.9***	***15.9***	***0.89***	***62.7%***	***0.72***	***0.66***	***0.70***	***0.55***

Gross First Year Savings (MTherms)

PA	Standard Report Group	Ex-Ante Gross	Ex-Post Gross	GRR	% Ex-Ante Gross Pass Through	Eval GRR
PGE	LIGHTING INDOOR LED FIXTURE	-216	-221	1.02	96.3%	1.56
PGE	LIGHTING INDOOR LED LAMP	-46	-32	0.71	9.6%	0.68
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	-51	-48	0.96	0.0%	0.96
PGE	LIGHTING OUTDOOR LED FIXTURE	0	0			
PGE	**Total**	**-313**	**-302**	**0.96**	**68.1%**	**0.89**
SCE	LIGHTING INDOOR LED FIXTURE	-79	-80	1.02	98.3%	1.87
SCE	LIGHTING INDOOR LED LAMP	-9	-9	0.90	26.1%	0.87
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	-13	-15	1.11	0.0%	1.11
SCE	LIGHTING OUTDOOR LED FIXTURE	0	0			
SCE	**Total**	**-102**	**-104**	**1.02**	**78.8%**	**1.08**
SDGE	LIGHTING INDOOR LED FIXTURE	-106	-106	1.00	99.1%	1.34
SDGE	LIGHTING INDOOR LED LAMP	-11	-10	0.93	42.9%	0.88
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	-10	-10	0.96	0.0%	0.96
SDGE	LIGHTING OUTDOOR LED FIXTURE	0	0			
SDGE	**Total**	**-127**	**-126**	**0.99**	**86.4%**	**0.95**
	Statewide	***-541***	***-531***	***0.98***	***74.4%***	***0.93***

Net First Year Savings (MTherms)

PA	Standard Report Group	Ex-Ante Net	Ex-Post Net	NRR	% Ex-Ante Net Pass Through	Ex-Ante NTG	Ex-Post NTG	Eval Ex-Ante NTG	Eval Ex-Post NTG
PGE	LIGHTING INDOOR LED FIXTURE	-147	-100	0.68	3.5%	0.68	0.45	0.68	0.44
PGE	LIGHTING INDOOR LED LAMP	-32	-23	0.73	100.0%	0.69	0.71		
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	-38	-37	0.97	100.0%	0.76	0.77		
PGE	LIGHTING OUTDOOR LED FIXTURE	0	0						
PGE	**Total**	**-218**	**-160**	**0.74**	**34.6%**	**0.70**	**0.53**	**0.68**	**0.44**
SCE	LIGHTING INDOOR LED FIXTURE	-57	-58	1.02	93.1%	0.72	0.72	0.75	0.84
SCE	LIGHTING INDOOR LED LAMP	-7	-7	0.93	100.0%	0.79	0.81		
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	-11	-12	1.11	100.0%	0.84	0.84		
SCE	LIGHTING OUTDOOR LED FIXTURE	0	0						
SCE	**Total**	**-75**	**-77**	**1.03**	**94.8%**	**0.74**	**0.75**	**0.75**	**0.84**
SDGE	LIGHTING INDOOR LED FIXTURE	-79	-74	0.94	19.6%	0.75	0.70	0.75	0.69
SDGE	LIGHTING INDOOR LED LAMP	-8	-8	0.95	100.0%	0.75	0.77		
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	-8	-8	0.96	100.0%	0.78	0.78		
SDGE	LIGHTING OUTDOOR LED FIXTURE	0	0						
SDGE	**Total**	**-95**	**-90**	**0.94**	**33.1%**	**0.75**	**0.71**	**0.75**	**0.69**
	Statewide	***-388***	***-327***	***0.84***	***45.9%***	***0.72***	***0.62***	***0.70***	***0.52***

APPENDIX AB STANDARDIZED PER UNIT SAVINGS

Per Unit (Quantity) Gross Energy Savings (kWh)

PA	Standard Report Group	Pass Through	% ER Ex-Ante	% ER Ex-Post	Average EUL (yr)	Ex-Post Lifecycle	Ex-Post First Year	Ex-Post Annualized
PGE	LIGHTING INDOOR LED FIXTURE	0	0.0%	0.0%	12.1	874.3	73.7	73.7
PGE	LIGHTING INDOOR LED LAMP	0	0.0%	0.0%	9.5	221.9	24.3	24.3
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	0	0.0%	0.0%	8.3	563.7	70.9	70.9
PGE	LIGHTING INDOOR LED FIXTURE	1	0.0%		15.0	483.5	41.1	41.1
PGE	LIGHTING INDOOR LED LAMP	1	0.0%		7.6	295.1	43.1	43.1
PGE	LIGHTING OUTDOOR LED FIXTURE	1	0.0%		12.0	4,542.5	378.5	378.5
SCE	LIGHTING INDOOR LED FIXTURE	0	0.0%	0.0%	6.6	501.3	85.1	85.1
SCE	LIGHTING INDOOR LED LAMP	0	0.0%	0.0%	10.0	190.8	20.5	20.5
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	0	0.0%	0.0%	8.2	569.3	75.4	75.4
SCE	LIGHTING INDOOR LED FIXTURE	1	0.0%		5.6	349.2	41.7	41.7
SCE	LIGHTING INDOOR LED LAMP	1	0.0%		9.6	339.9	40.9	40.9
SCE	LIGHTING OUTDOOR LED FIXTURE	1	0.0%		12.0	12,096.1	1,008.0	1,008.0
SDGE	LIGHTING INDOOR LED FIXTURE	0	0.0%	0.0%	7.6	588.9	91.9	91.9
SDGE	LIGHTING INDOOR LED LAMP	0	0.0%	0.0%	8.3	269.2	36.4	36.4
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	0	0.0%	0.0%	7.0	653.4	103.2	103.2
SDGE	LIGHTING INDOOR LED FIXTURE	1	88.5%		14.7	326.4	46.3	23.8
SDGE	LIGHTING INDOOR LED LAMP	1	0.0%		6.9	383.4	66.1	66.1
SDGE	LIGHTING OUTDOOR LED FIXTURE	1	0.0%		12.0	2,328.5	194.0	194.0

Per Unit (Quantity) Gross Energy Savings (Therms)

PA	Standard Report Group	Pass Through	% ER Ex-Ante	% ER Ex-Post	Average EUL (yr)	Ex-Post Lifecycle	Ex-Post First Year	Ex-Post Annualized
PGE	LIGHTING INDOOR LED FIXTURE	0	0.0%	0.0%	12.1	-4.8	-0.4	-0.4
PGE	LIGHTING INDOOR LED LAMP	0	0.0%	0.0%	9.5	-1.2	-0.1	-0.1
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	0	0.0%	0.0%	8.3	-2.6	-0.3	-0.3
PGE	LIGHTING INDOOR LED FIXTURE	1	0.0%		15.0	-3.3	-0.3	-0.3
PGE	LIGHTING INDOOR LED LAMP	1	0.0%		7.6	-1.8	-0.3	-0.3
PGE	LIGHTING OUTDOOR LED FIXTURE	1	0.0%		12.0	0.0	0.0	0.0
SCE	LIGHTING INDOOR LED FIXTURE	0	0.0%	0.0%	6.6	-1.0	-0.2	-0.2
SCE	LIGHTING INDOOR LED LAMP	0	0.0%	0.0%	10.0	-0.5	-0.1	-0.1
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	0	0.0%	0.0%	8.2	-1.3	-0.2	-0.2
SCE	LIGHTING INDOOR LED FIXTURE	1	0.0%		5.6	-0.9	-0.1	-0.1
SCE	LIGHTING INDOOR LED LAMP	1	0.0%		9.6	-0.8	-0.1	-0.1
SCE	LIGHTING OUTDOOR LED FIXTURE	1	0.0%		12.0	0.0	0.0	0.0
SDGE	LIGHTING INDOOR LED FIXTURE	0	0.0%	0.0%	7.6	-1.9	-0.3	-0.3
SDGE	LIGHTING INDOOR LED LAMP	0	0.0%	0.0%	8.3	-0.9	-0.1	-0.1
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	0	0.0%	0.0%	7.0	-2.0	-0.3	-0.3
SDGE	LIGHTING INDOOR LED FIXTURE	1	88.5%		14.7	-3.6	-0.6	-0.2
SDGE	LIGHTING INDOOR LED LAMP	1	0.0%		6.9	-1.3	-0.2	-0.2
SDGE	LIGHTING OUTDOOR LED FIXTURE	1	0.0%		12.0	0.0	0.0	0.0

Per Unit (Quantity) Net Energy Savings (kWh)

PA	Standard Report Group	Pass Through	% ER Ex-Ante	% ER Ex-Post	Average EUL (yr)	Ex-Post Lifecycle	Ex-Post First Year	Ex-Post Annualized
PGE	LIGHTING INDOOR LED FIXTURE	0	0.0%	0.0%	15.0	213.5	18.1	18.1
PGE	LIGHTING OUTDOOR LED FIXTURE	0	0.0%	0.0%	12.0	2,355.5	196.3	196.3
PGE	LIGHTING INDOOR LED FIXTURE	1	0.0%		12.1	568.4	47.9	47.9
PGE	LIGHTING INDOOR LED LAMP	1	0.0%		9.3	161.5	18.2	18.2
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	1	0.0%		8.3	419.8	53.1	53.1
SCE	LIGHTING INDOOR LED FIXTURE	0	0.0%	0.0%	5.1	119.5	19.8	19.8
SCE	LIGHTING OUTDOOR LED FIXTURE	0	0.0%	0.0%	12.0	7,400.8	616.7	616.7
SCE	LIGHTING INDOOR LED FIXTURE	1	0.0%		5.7	286.4	34.3	34.3
SCE	LIGHTING INDOOR LED LAMP	1	0.0%		9.9	174.6	19.2	19.2
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	1	0.0%		8.2	474.7	63.1	63.1
SCE	LIGHTING OUTDOOR LED FIXTURE	1	0.0%		12.0	0.0	0.0	0.0
SDGE	LIGHTING INDOOR LED FIXTURE	0	83.0%	83.0%	14.6	269.5	34.6	20.0
SDGE	LIGHTING OUTDOOR LED FIXTURE	0	0.0%	0.0%	12.0	1,993.2	166.1	166.1
SDGE	LIGHTING INDOOR LED FIXTURE	1	92.6%		14.4	165.0	31.2	13.8
SDGE	LIGHTING INDOOR LED LAMP	1	0.0%		7.9	240.5	35.3	35.3
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	1	0.0%		7.0	523.4	81.7	81.7

Per Unit (Quantity) Net Energy Savings (Therms)

PA	Standard Report Group	Pass Through	% ER Ex-Ante	% ER Ex-Post	Average EUL (yr)	Ex-Post Lifecycle	Ex-Post First Year	Ex-Post Annualized
PGE	LIGHTING INDOOR LED FIXTURE	0	0.0%	0.0%	15.0	-1.4	-0.1	-0.1
PGE	LIGHTING OUTDOOR LED FIXTURE	0	0.0%	0.0%	12.0	0.0	0.0	0.0
PGE	LIGHTING INDOOR LED FIXTURE	1	0.0%		12.1	-3.1	-0.3	-0.3
PGE	LIGHTING INDOOR LED LAMP	1	0.0%		9.3	-0.9	-0.1	-0.1
PGE	LIGHTING INDOOR LED REFLECTOR LAMP	1	0.0%		8.3	-2.0	-0.3	-0.3
SCE	LIGHTING INDOOR LED FIXTURE	0	0.0%	0.0%	5.1	-0.2	0.0	0.0
SCE	LIGHTING OUTDOOR LED FIXTURE	0	0.0%	0.0%	12.0	0.0	0.0	0.0
SCE	LIGHTING INDOOR LED FIXTURE	1	0.0%		5.7	-0.8	-0.1	-0.1
SCE	LIGHTING INDOOR LED LAMP	1	0.0%		9.9	-0.4	-0.1	-0.1
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	1	0.0%		8.2	-1.1	-0.2	-0.2
SCE	LIGHTING OUTDOOR LED FIXTURE	1	0.0%		12.0	0.0	0.0	0.0
SDGE	LIGHTING INDOOR LED FIXTURE	0	83.0%	83.0%	14.6	-3.1	-0.5	-0.2
SDGE	LIGHTING OUTDOOR LED FIXTURE	0	0.0%	0.0%	12.0	0.0	0.0	0.0
SDGE	LIGHTING INDOOR LED FIXTURE	1	92.6%		14.4	-1.4	-0.3	-0.1
SDGE	LIGHTING INDOOR LED LAMP	1	0.0%		7.9	-0.8	-0.1	-0.1
SDGE	LIGHTING INDOOR LED REFLECTOR LAMP	1	0.0%		7.0	-1.6	-0.3	-0.3

APPENDIX AC RESPONSE TO RECOMMENDATIONS

EM&V Impact Study Recommendations
Study Title: 2017 Nonresidential ESPI Deemed Lighting Impact Evaluation
Study Manager: CPUC

ID		Section	Conclusion	Recommendation	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
1a	CPUC	5	Overall, ex post operating hours for LED downlight measures were dramatically different than ex ante claims.	Based on these two conclusions, future evaluations should consider conducting a large-scale monitoring study, especially for technologies like LED downlights and reflector lamps installed in high usage areas. The annual operation of these technologies can have potentially significant impacts on realized energy and demand savings moving forward. Furthermore, the presence of EMS and advanced dimming capabilities, along with the fact that these technologies are generally recessed into the ceiling, suggest that monitoring studies should consider alternative monitoring techniques (like panel metering and other connected devices) to augment traditional photocell logging techniques. The study should be conducted by technology and building type to capture differences across building type within a given technology.		
1b	CPUC	3	A number of sampled nonresidential facilities were on energy management systems (EMS) and many of the measure installations represented dimmable technologies.			
2	CPUC	5	The average replaced wattages for screw-in LED A-Lamps continue to decrease relative to prior evaluations, and this is likely true for other reflector/downlight measures.	While ex ante savings claims move away from a dependence on lamp wattages and continue moving toward savings based on EISA wattages and lamp efficacy, future evaluations should continue to track and verify (where possible) the replaced/baseline wattage of all LED measure installations to determine, for LED A-Lamps, if the percentage of CFLs/LEDs in the baseline continues to grow, and for reflector lamps and downlighting, if there are any significant changes in the distribution of baseline technologies moving forward.		

ID		Section	Conclusion	Recommendation	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
3	CPUC	Appendix D	A not insignificant percentage of program participants installing LED fixture measures self-reported metal halide (MH), mercury vapor (MV) and high-pressure sodium (HPS) as the baseline technology replaced as part of the retrofit – especially for outdoor LED fixture measures.	Further research should be conducted to continue to track the typical baseline and efficiency of equipment replaced with program rebated LED indoor and outdoor technologies.		
4	CPUC	Appendix D	A significant percentage of program participants installing LED fixtures self-reported the condition of the pre-existing equipment in NOT poor condition and/or that the program influenced them to retrofit the equipment prior to the burn-out or failure of the existing equipment.	Future studies and programs should consider a framework to recognize the age of the existing equipment and the likelihood that a program participant would have either 1) deferred installation and maintained or continually repaired their existing system or 2) installed equipment that was no more efficient than code at the time they did, in the absence of the program.		
5	PG&E, SCE, SDG&E	Over-arching	When comparing ex ante parameter estimates to ex post results, not all documentation could be found detailing the specific parameters comprised of the ex ante claimed savings values. This caused unnecessary coordination with the PAs to find missing workpapers.	All workpaper documentation (workbook calculations and supporting documents) should be posted on the workpaper project archive (WPA) at www.deeresources.info.		

ID		Section	Conclusion	Recommendation	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
6	PG&E, SCE, SDG&E	Over-arching	The evaluation team sometimes found that the expected parameter values used in the ex ante savings claims were not based on the reported ex ante IDs.	Ex ante IDs should match with parameters used in the *actual* reported ex ante savings.		
7	PG&E	Over-arching	The evaluation team found a significant percentage of claims and associated energy/demand savings used the "COM" building type designation in PG&E.	For ex ante HOU and CDF, the "COM" building type should be avoided and only used when necessary.		

APPENDIX A PHONE SURVEY INSTRUMENT

Participant Survey for CPUC
PY2017 Downstream Lighting Evaluation

INTRODUCTION AND FINDING CORRECT RESPONDENT

OUTCOME1

This is %n calling on behalf of the CPUC, from PACIFIC MARKET RESEARCH. 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.

1	Yes (go to next screen)	Continue
2	Make appointment	Make appt and record time
3	Busy/engaged	Record Response and T&T
4	No Answer	Record Response and T&T
5	Refused	Record Response and T&T
6	Disconnected	Record Response and T&T
7	Answering Machine - no message	Record Response and T&T
8	Duplicate	Record Response and T&T
9	DRNA	Record Response and T&T
10	Disability	Record Response and T&T
11-12	Language Barriers	Record Response and T&T
13	Answering Machine - left message	Record Response and T&T
14	NO SCREEN - Participant	Record Response and T&T
15	Hang up	Record Response and T&T
16	Residence	Record Response and T&T
17	Fax	Record Response and T&T
18	Quota full	Record Response and T&T
19	Wrong Address	Record Response and T&T
20	Home office	Record Response and T&T
21	Max attempts	Record Response and T&T
24	General callback	Record Response and T&T
25	Name/Number changed	Record Response and T&T

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

[IF YOU ARE TRANSFERRED TO ANOTHER PERSON OTHER THAN THE BEST CONTACT]

Q1B 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
1	Continue Q1B until you find appropriate contact person, record as &NEW CONTACT NAME	Intro3:s

[IF BEST CONTACT IS AVAILABLE]

Intro3:S Hello, my name is _____%n_____ and I am calling on behalf of the California Public Utilities Commission from PACIFIC MARKET RESEARCH. 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 2017...I was told that would be you.

...Your organization participated in <%UTILITY>'s <%PROGRAM> by installing lighting equipment in 2017.

[Small Commercial/HVAC/ERS only no Lighting]

You should have received an email recently that explained the evaluation process and provided a letter from the CPUC validating this study.

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?

1	Yes	Person:s
2	No, there is someone else	Intro3:s
3	No and I don't know who to refer you to	Appoint
5	Property management company handles this	PMNAME
99	Don't know/refused	T&T

Ext Is there a phone extension or phone number you recommend we use when we call back?

77	Record Extension or Phone Number, &PHONE	Thank&Terminate
88	Refused	Thank&Terminate
99	Don't know	Thank&Terminate

PMNAME	May I have the name and contact information of your property management company?	
1	Yes - RECORD	Record Response and T&T
2	No	Thank&Terminate
88	Refused	Thank&Terminate
99	Don't Know	Thank&Terminate

Appoint	[IF RECOMMENDED CONTACT IS NOT CURRENTLY AVAILABLE] When would be a good day and time for us to call back?	
77	Record day of the week, time of day and date to call back, as &APPOINT	Record Response and T&T
88	Refused	Intro3(99)
99	Don't know	Intro3(99)

	If Person(3)	
Intro3(99)	Thank you for your time. We need to speak with the person at your organization that is most familiar with this facility's energy using equipment. Those are all of the questions I have for you today.	Abandoned User30

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	Intro3(99)

May_I	May I speak with him/her?	
77	Yes	Intro3:s
88	No (not available right now@, set cb)	Abandoned Appointment

PERSON:s	According to our records, your organization participated in <%UTILITY>'s <%PROGRAM> program by installing energy saving equipment around ... <%DEEM_PAID_DATE1> <%CUST_PAID_DATE> 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 person most knowledgeable about your organization's participation in ...<%UTILITY>'s <%PROGRAM> Program?	
1	Yes	Continue
2	Yes, need to make appointment	Appoint
4	No, but I will give you a name	Thank&Terminate
99	No one knows about the energy using equipment	Thank&Terminate

If you need to provide validation for this survey, provide the following contact name and number: XXX and the following website:
www.cpuc.ca.gov/eevalidation
Before we start, I would like to inform you that for quality control purposes, this call may be monitored by my supervisor.

DISPLAY 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.

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)	FM050a
2	Restaurant/Food Service	FM050b
3	Food Store (grocery/liquor/convenience)	FM050c
4	Agricultural (farms, greenhouses)	FM050d
5	Retail Stores	FM050e
6	Warehouse	FM050f
7	Health Care	FM050g
8	Education	FM050h
9	Lodging (hotel/rooms)	FM050i
10	Public Assembly (church, fitness, theatre, library, museum, convention)	FM050j
11	Services (hair, nail, massage, spa, gas, repair)	FM050k
12	Industrial (food processing plant, manufacturing)	FM050l
13	Laundry (Coin Operated, Commercial Laundry Facility, Dry Cleaner)	FM050m
14	Condo Assoc./Apartment Mgr (Garden Style, Mobile Home Park, High-rise, Townhouse)	FM050n
15	Public Service (fire/police/postal/military)	FM050o
77	OPEN\Record Other Service Shop	LANG
88	Refused	LANG
99	Don't know	LANG

FM050a	Which of the following types of offices best describes this facility? Would you say...[READ] (SINGLE RESPONSE)	
1	Administration and management	LANG
2	Financial/Legal	LANG
3	Insurance/Real Estate	LANG
4	Data Processing/Computer Center	LANG
5	Mixed-Use/Multi-tenant	LANG
6	Lab/R&D Facility	LANG
7	Software Development	LANG
8	Government Services	LANG
9	Office with Warehouse	LANG
10	Contractor's Offices	LANG
11	Telecommunications Center (call center)	LANG
12	Travel Services (Travel Agent)	LANG
77	OPEN\DO NOT USE unless necessary	LANG
88	Refused	LANG
99	Don't know	LANG

FM050b Which of the following types of restaurants or food service best describes this facility? Would you say… [READ] (SINGLE RESPONSE)

1	Fast Food or Self Service	LANG
2	Specialty/Novelty Food Service	LANG
3	Table Service	LANG
4	Bar/Tavern/Nightclub/Brew Pub or Microbrewery/Other entertainment	LANG
5	Caterer	LANG
6	Other Food Service	LANG
88	Refused	LANG
99	Don't know	LANG

FM050c Which of the following types of food stores best describes this facility? Would you say...[READ] (SINGLE RESPONSE)

1	Supermarkets	LANG
2	Small General Grocery	LANG
3	Specialty/Ethnic Grocery/Deli	LANG
4	Convenience Store	LANG
5	Liquor Store	LANG
6	Retail Bakery	LANG
77	OPEN\DO NOT USE unless necessary	LANG
88	Refused	LANG
99	Don't know	LANG

FM050d What type of agricultural facility is this? [READ] (SINGLE RESPONSE)

1	Commercial Greenhouse	LANG
2	Commercial Farm	LANG
3	Dairy/Ranch	LANG
4	Vineyard/Orchard	LANG
5	Agricultural Storage (Grain Elevators, etc.)	LANG
6	Equine Facility (Horse Boarding/Grooming/Racing/Breeding)	LANG
77	OPEN\Describe type of agricultural facility	LANG
88	Refused	LANG
99	Don't know	LANG

FM050e Which of the following types of retail stores best describes this facility? Would you say… [READ] (SINGLE RESPONSE)

1	Department/Variety Store	LANG
2	Retail Warehouse/Club	LANG
3	Shop in Enclosed Mall	LANG
4	Shop in Strip Mall	LANG
5	Auto/Truck/Motorcycle Sales	LANG
6	Art Gallery	LANG
7	Auction House	LANG
8	Heavy Equipment Sales	LANG
9	Facility is a Mall/Strip Mall	LANG
77	OPEN\DO NOT USE unless necessary	LANG
88	Refused	LANG
99	Don't know	LANG

FM050f Which of the following types of warehouses best describes this facility? Would you say… [READ] (SINGLE RESPONSE)

1	Refrigerated Warehouse	LANG
2	Unconditioned Warehouse, High Bay (lighting higher than 13 ft.)	LANG
3	Unconditioned Warehouse, Low Bay	LANG
4	Conditioned Warehouse, High Bay (lighting higher than 13 ft.)	LANG
5	Conditioned Warehouse, Low Bay	LANG
6	Shipping/Distribution Center	LANG
7	Garage/Parking/Storage for Commercial Fleet	LANG
8	Public Self Storage Facility	LANG
77	OPEN\DO NOT USE unless necessary	LANG
88	Refused	LANG
99	Don't know	LANG

FM050g Which of the following types of health care centers best describes this facility? Would you say… [READ] (SINGLE RESPONSE)

1	Hospital	LANG
2	Nursing Home	LANG
3	Medical/Dental Office	LANG
4	Clinic/Outpatient Care	LANG
5	Medical/Dental Lab	LANG
6	Alcohol/Drug Treatment/Rehabilitation	LANG
7	Doctor's Office	LANG
8	Dentist's Office	LANG
9	Veterinary Hospital/Clinic	LANG
77	OPEN\DO NOT USE unless necessary	LANG
88	Refused	LANG
99	Don't know	LANG

FM050h Which of the following types of educational centers best describes this facility? Would you say… [READ] (SINGLE RESPONSE)

1	Daycare or Preschool	LANG
2	Elementary School	LANG
3	Middle/Secondary School	LANG
4	College or University	LANG
5	Vocational or Trade School	LANG
6	Instructional Studio (Dance/Music/Martial Arts)	LANG
77	OPEN\DO NOT USE unless necessary	LANG
88	Refused	LANG
99	Don't know	LANG

FM050i Which of the following types of lodging best describes this facility? Would you say… [READ] (SINGLE RESPONSE)

1	Hotel	LANG
2	Motel	LANG
3	Resort	LANG
4	Bed and Breakfast	LANG
5	Campground/Trailer Camping/KOA	LANG
6	Residential Hotel/Motel	LANG
7	Dormitory/Sorority/Fraternity	LANG
8	Activity Camp/Summer Camp	LANG
77	OPEN\DO NOT USE unless necessary	LANG
88	Refused	LANG
99	Don't know	LANG

FM050j Which of the following types of public assembly buildings best describes this facility? Would you say… [READ] (SINGLE RESPONSE)

1	Religious Assembly (worship only)	LANG
2	Religious Assembly (mixed use)	LANG
3	Health/Fitness Center/Athletic Center/Gym	LANG
4	Movie Theaters	LANG
5	Theater/Performing Arts Venue	LANG
6	Library/Museum	LANG
7	Conference/Convention Center	LANG
8	Community Center/Activity Center	LANG
9	Country Club	LANG
77	OPEN\DO NOT USE unless necessary	LANG
88	Refused	LANG
99	Don't know	LANG

FM050k	Which of the following types of service buildings best describes this facility? Would you say...[READ] (SINGLE RESPONSE)	
1	Hair Salon	LANG
2	Nail Salon	LANG
3	Massage Spa	LANG
4	Day Spa	LANG
5	Gas Station/Auto Repair	LANG
6	Gas Station w/Convenience Store	LANG
7	Repair (Non-Auto)	LANG
8	Copy Center/Printing	LANG
9	Package Delivery (Fed Ex/UPS/DHL)	LANG
10	HVAC Repair Installation	LANG
11	Aircraft Maintenance/Repair	LANG
12	Airport	LANG
13	Parking Lot/Commuter Service	LANG
14	Marina	LANG
15	Amusement (mini-golf/go-carts/skating/bowling)	LANG
16	Pet Care/Grooming	LANG
17	Car Rental	LANG
18	Car Wash	LANG
19	Cemetery/Mortuary/Crematorium	LANG
20	Equipment Rental	LANG
21	Fleet Fueling Services	LANG
22	Pest Control	LANG
23	Photographer	LANG
24	Vehicle Inspections	LANG
25	Transportation	LANG
26	Upholstery	LANG
77	OPEN\DO NOT USE unless necessary	LANG
88	Refused	LANG
99	Don’t know	LANG

FM050l Which of the following types of buildings best describes this facility? Would you say...[READ] (SINGLE RESPONSE)

1	Assembly/Light Manufacturing	LANG
2	Food Processing Plant	LANG
3	Recycling Center	LANG
4	Commercial/Industrial Bakery	LANG
5	Commercial Brewery/Winery	LANG
6	Chemical/Petrochemical Production	LANG
7	Industrial Process	LANG
8	Radio/Television/Film/Music Production	LANG
9	Energy Generation/Distribution	LANG
10	Machine Shop	LANG
11	Pharmaceutical Production/Manufacturing	LANG
12	Mail Sorting	LANG
13	Mining	LANG
77	OPEN\DO NOT USE unless necessary	LANG
88	Refused	LANG
99	Don't know	LANG

FM050m What type of laundry facility is this? [READ] (SINGLE RESPONSE)

1	Coin Operated	LANG
2	Commercial Laundry Facility	LANG
3	Dry Cleaners	LANG
77	OPEN\Record other building type	LANG
88	Refused	LANG
99	Don't know	LANG

FM050n Which of the following types of buildings best describes this facility? Would you say...[READ] (SINGLE RESPONSE)

1	Garden Style	LANG
2	Mobile Home	LANG
3	High-rise	LANG
4	Townhouse	LANG
5	Condominium	LANG
6	Apartment	LANG
7	Artists' Studio/Live Work/Loft	LANG
8	Assisted Living	LANG
77	OPEN\Record other building type	LANG
88	Refused	LANG
99	Don't know	LANG

FM050o Which of the following types of buildings best describes this facility? Would you say...[READ] (SINGLE RESPONSE)

1	Police station	LANG
2	Fire station	LANG
3	Post office	LANG
4	Military	LANG
5	Ambulance Service	LANG
6	Jail/Correctional facility	LANG
7	Courthouse	LANG
8	Library	LANG
9	Water/Waste Water Treatment	LANG
10	General Government (Municipal/State/Federal Agency Buildings)	LANG
11	Public Park	LANG
77	OPEN\Record other building type	LANG
88	Refused	LANG
99	Don't know	LANG

LANG Is another language besides English used to conduct business at this facility?

1	Yes	OTH_LANG
2	No	CC2a
88	Refused	CC2a
99	Don't Know	CC2a

OTH_LANG Which languages are used to conduct business at this facility? [ACCEPT MULTIPLES]

1	Spanish	CC2a
2	Chinese	CC2a
3	Korean	CC2a
4	Vietnamese	CC2a
5	Japanese	CC2a
6	Hindi	CC2a
77	OPEN	CC2a
88	Refused	CC2a
99	Don't know	CC2a

CUSTOMER CHARACTERISTICS

Now, I'd like to ask you questions regarding your facility.

CC2a What is the total square footage at this facility?

77	RECORD Square feet	CC2c
888888	Refused	CC3
999999	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
101	Refused	C0
102	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

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 2016?

1	Increase in square footage	BC100
2	Decrease in square footage	BC110
3	Stayed the same	V1
88	Refused	V1
99	Don't know	V1

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	2016	V1
2	2017	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	V2b
2	No	V3
88	Refused	V3
99	Don't Know	V3

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	V4
2	No	AP9
88	Refused	AP9
99	Don't Know	AP9

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.	A3A

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 Quanity	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?

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	2016	DEEM_INSTALL_MONTHx
2	2017	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 can not 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 LI19[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	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	Gynasium	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 were 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 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	NEXT SECTION (NTG BATTERY)
2	Worse	DEL11
3	Same	NEXT SECTION (NTG BATTERY)
88	Refused	DEL11
99	Don't know	DEL11

If DEL5 in (2, 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

DISPLAY For the sake of expediency, during this next battery we will be referring to the ..... program as THE PROGRAM and we will be referring to the installation of ...<%NTGMEASURE>... as THE MEASURE.

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?

AA3		
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 or, after, or at the same time as you became aware of that 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 through the program. 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 >= 3 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 >= 2, 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 >= 2

N3j Standard practice in your business/industry

#	Record 0 to 10 score (_____)	N3k
88	Refused	N3k
99	Don't know	N3k

If AP9 = 3 or AP9a = 3 THEN ASK; ELSE SKIP TO N3m

N3l Endorsement or recommendation by your account rep?

#	Record 0 to 10 score (_____)	N3ll
88	Refused	N3m
99	Don't know	N3m

IF N3l > 5 & NTG_TYPE >= 2 THEN ASK

N3ll What did they recommend?

77	Record VERBATIM	N3lll
88	Refused	N3m
99	Don't know	N3m

IF N3LL(77)

N3lll 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 >= 2, 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 = 4, 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 >= 3

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 = 4

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

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?

CC1a

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

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

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?

NCC3

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

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?

NCC3a

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

PAYBACK BATTERY

If INCENT <> 100 AND NTG_TYPE >= 2, THEN ASK; ELSE SKIP TO P3

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

P1

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
99	Refused	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)

(READ ITEMS WHERE THEY GAVE A RATING OF 8 or higher)

Program-related factors

<%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?

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) | ~~DELAMP == 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

N5a	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?	
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

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?

N6

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

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?

N6aa

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	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 NTG_TYPE >= 2

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

CA6	**IF LT3(1||4);** 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	ALWAYS
2	No	ALWAYS
88	Refused	ALWAYS
99	Don't know	ALWAYS

OPERATING HOURS

DISPLAY We are almost finished. The next few questions are to help us get a full understanding of your organization's operational hours.

ALWAYS Is your organization operation 24 hours a day, 7 days a week?

1	Yes	HOLIDAYS
2	No	HOLIDAYS
88	Refused	HOLIDAYS

HOLIDAYS Dose 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 - January 18, 2010 (3rd Monday in January)	DAYS
3	President's Day - February 15, 2010 (3rd Monday in February)	DAYS
4	Memorial Day - May 31, 2010 (Last Monday in May)	DAYS
5	Independence Day - July 4th (Or Surrounding Monday/Friday if July 4 is a weekend)	DAYS
6	Labor Day - September 6, 2010 (First Monday in September)	DAYS
7	Thanksgiving - November 26, 2010 (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; else skip to OS_REC;

DAYS	Is your facility closed any of the 7 days of the week? 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)&^DAYS(1); else skip to TUESDAY_OPEN;

MONDAY_OPEN	What time do 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 do 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)&^DAYS(2); else skip to WEDNESDAY_OPEN;

TUESDAY_OPEN	What time do 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 do 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)&^DAYS(3); else skip to THURSDAY_OPEN;

WEDNESDAY_OPEN What time do 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 do 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)&^DAYS(4); else skip to FRIDAY_OPEN;

THURSDAY_OPEN What time do 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 do 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)&^DAYS(5); else skip to SATURDAY_OPEN;

FRIDAY_OPEN What time do 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 do 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)&^DAYS(6); else skip to SUNDAY_OPEN;

SATURDAY_OPEN What time do 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 do 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)&^DAYS(7); else skip to DIFF_SCHEDULE;

SUNDAY_OPEN What time do 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 do 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 organizations 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	OS_REC
88	REFUSED	OS_REC
99	DON'T KNOW	OS_REC

Ask if DIFF_SCHEDULE = 1; Else skip to OS_REC;

MONTHS Which months of the year does the schedule vary from the times I just recorded?

1	January	ALT_DAYS
2	February	ALT_DAYS
3	March	ALT_DAYS
4	April	ALT_DAYS
5	May	ALT_DAYS
6	June	ALT_DAYS
7	July	ALT_DAYS
8	August	ALT_DAYS
9	September	ALT_DAYS
10	October	ALT_DAYS
11	November	ALT_DAYS
12	December	ALT_DAYS
88	REFUSED	ALT_DAYS
99	DON'T KNOW	ALT_DAYS

ALT_ALWAYS Is your organization operation 24 hours a day, 7 days a week?

1	Yes	HOLIDAYS
2	No	HOLIDAYS
88	Refused	HOLIDAYS

If ^ALT_ALWAYS(1) then ask; Else skip to OS_REC;

ALT_DAYS During this alternate schedule, is your facility closed any of the 7 days of the week? If so, which days are 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 do 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 do 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 do 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 do 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 do 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 do 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 do 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 do 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 do 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 do 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 are also open on Saturday. What time do 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 do 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 OS_REC;

ALT_SUNDAY_OPEN I recorded that during your alternate schedule you are also open on Sunday. What time do 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 do you close your facility on SUNDAY?

	Record Time 1AM - 12:30 AM in 12 hour format by half hour as 1-24	LOG_REC
88	REFUSED	LOG_REC
99	DON'T KNOW	LOG_REC

Participant Survey for CPUC

PY2017 Downstream Lighting Evaluation

ONSITE RECRUITING

TO SCHEDULE INSTALLATION OF MONITORING EQUIPMENT

If LOGGER= 1; Else Skip to Comment1

DISPLAY	In order to improve this program's performance, <%UTILITY> would also like to make an accurate measurement of the energy savings associated with the energy efficient equipment installed by collecting and analyzing information from selected customers. If you agree to participate, Itron, on behalf of <%UTILITY>, will come to your business to install monitoring devices on your equipment to record when the equipment is in use. The monitoring devices will be installed in an unobtrusive place and would be removed by us at the end of the research project. We expect the site visit to take about two hours. We'll come back and remove the monitoring devices within 3-6 months. Note, the electric use data will be used strictly for the study of the <%PROGRAM> and will not affect your electric service at all. You will need to sign a brief participation agreement.	LOG_REC

LOG_REC	Are you interested in participating in this project?	
1	Yes	LOG_NAME
2	No	Comment1
88	Refused	Comment1
99	Don't know	Comment1

ASK IF LOG_REC(1)

LOG_NAME	May I have the name of the person that our technician should contact to make an appointment?	LOG_PHONE
LOG_PHONE	What would be the most convenient phone number for our technecian to contact ....<%LOG_NAME>?	LOG_ALT
LOG_ALT	In the even that ....<%LOG_NAME> ... is unavailable, would there be an alternate contact that we could schedule an appointment with?	LOG_PH_ALT
LOG_PH_ALT	What would be the most convenient phone number to reach this person?	LOG_NOTE
LOG_NOTE	Are there any notes that would facilitate our technician's ability to make an appointment? For example, are some days of the week better for making contacts, are early mornings better or are afternoons better?	

66	No Notes	OS_NAME1
77	Record Notes	OS_NAME1

IF ONSITE = 1

TO SCHEDULE ONSITE VERIFICATION

COMMENT1 As we've discussed, the <%PROGRAM> is an important component of the California Public Utilities Commission's ongoing efforts to save energy and reduce emissions affecting climate change. In order to improve this program's performance, the CPUC would like to make an accurate measurement of the energy savings associated with energy efficiency equipment installed by collecting and analyzing information from selected customers. Your input to this research is extremely important. By receiving a rebate through the <%PROGRAM>, your firm has agreed to allow verification of the installation of the equipment rebated through the program.

OS_NAME1 Our verification technician will need to meet a facilities representative of your company. This should be either the manager of the facility or part of the facilities staff.
May I please have the name of the person who our technician can call you to set up an appointment time?

1	Same as for logger	HB_Lift
77	Record Name	OS_PHONE1
99	Don't know	T&T

IF OS_NAME1(77)

OS_PHONE1 May I also have the best phone number for the technician to reach this person?

&OS_PHONE1	PHONE FOR PRIMARY CONTACT	OTHER
88	Refused	T&T
99	Don't know	T&T

OTHER Is there another person that the engineer might speak with at your company, if this primary person is not available?

&OTHER	Get name	OS_NAME2
88	Refused	T&T
99	Don't know	T&T

OS_NAME2 May I please have their name so our technician can call them at another time?

&OS_NAME2	Get name	OS_PHONE2
88	Refused	T&T
99	Don't know	T&T

OS_PHONE2 May I also have the best phone number for the technician to reach them?

&OS_PHONE2	Get phone number	HB_Lift
88	Refused	T&T
99	Don't know	T&T

Ask if HIGHBAY = 1 or (HB1 > 12 and HB1<>66 and HB1<>88 and HB1<>99) or HB2 = 1 or HB1a = 1; Else skip to OS_Business

HB_Lift	Do you have some form or a lift or ladder available to reach the lighting at your facility that is located 13ft or more above ground?	
1	Yes	OS_Business
2	No	OS_Business
88	Refused	T&T
99	Don't know	T&T

OS_Business	Do you have a sign or business name other than <%BUSINESS> that our technicians should look for when they visit your site?	
1	Yes	OS_Bus_Name
2	No	Vendor_Name
88	Refused	T&T
99	Don't know	T&T

Ask if OS_BUSINESS(1)

OS_Bus_Name	What is the sign or business name they should be looking for?	
1	Get name	Vendor_Name

VISIT_NOTES	DO NOT READ.....If you have any special notes about the on@-site visit or the installation of loggers, add these notes here.	
1	No additional notes	Vendor_Name
77	Record Notes	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 B PARTICIPANT ON-SITE SURVEY INSTRUMENT

CPUC 2015 Nonresidential
On-Site Verification Survey Form

General Site Information (from phone survey & IOU tracking database)

Itron SiteID			
Sample Strata		What to Do	
Evaluation		What to	

Corporate (Multi-Site) Name			
Business Name (Tracking			
Actual Business Name			
Service Address			
City		Zip Code	
CORRECTIONS TO SITE INFORMATION			
Revised Corp. (Multi-Site)			
Revised Business Name			
Revised Service Address			
Revised City		Revised Zip	

Site Contact Information

PS Completion Date:	_____	Length (min)	____	Respondent:	____ ____ ____ ____	Date of Install:	_____

	Contacted	Contact Name	Phone Number	Alternate Phone	Email Address
OS Primary	☐				
OS Back-up	☐				
OS Other	☐				

Note: Use the "Contacted" check box to indicate the actual contact(s) for the site visit.

Scheduling Notes/Special Instructions for On-site Visit: _____

_____

Survey Tracking Information

Survey Company:		Assigned Surveyor's Initials:	
Survey Travel Mileage:	miles	Total Travel Time	hrs
Survey Duration (24 hr clock)	Start:	Survey Duration (24 hr clock)	End:
Total Onsite Time	hrs	Total Time to Fill Out Survey Form	hrs

	Date:	• **Initials**
Field survey completed:	__ __ / __ __ / __ __	__ __ __

Survey received from surveyor:	__ __ / __ __ / __ __	__ __ __
Initial QC check completed:	__ __ / __ __ / __ __	__ __ __
Survey sent back to surveyor (*if needed*):	__ __ / __ __ / __ __	__ __ __
Received from surveyor (*if needed*):	__ __ / __ __ / __ __	__ __ __
Itron QC completed:	__ __ / __ __ / __ __	__ __ __
Data entry (DE) completed:	__ __ / __ __ / __ __	__ __ __
Logger extraction DE complete:	__ __ / __ __ / __ __	__ __ __
Follow-up Logger Extraction DE complete:	__ __ / __ __ / __ __	__ __ __

IOU Tracking Data Measure Summary Sheet

This is a summary of all of the measures implemented at this site as extracted from the IOU tracking database. All of the measures listed here should also be found on the measure-level verification forms.

Measure Category	Meas ID	Measure Code	IOU MeasureName	Unit Basis	Rebated # of Units	Reference Meas Code

Lighting Other Description

Measure Code	Revised MeasureName Description	Rebated # of Units

Phone Survey Self-Reported Measure Counts for Calculated kWh Measures

CATI Measure Category-RebatedUnits-UnitBasis	Self Report # of Units

Phone Survey High Bay Information

High Bay?	Max Fixture Height (ft)	Access to fixtures via lift or ladder?

Custom Measure Summary

Meas ID	Measure Name	Measure State	Activity Area	Unit Basis	Qty	Lamps per Fixture	Length	Type	Watts

Site & Business Characteristics

PRIMARY BUSINESS TYPE DESCRIPTION: *(do not leave blank)*	

Phone Survey	**Phone Survey Building Type:**	*FM050*
	Detailed Building Type:	*FM050a-j*

Recent Survey Area Changes: Give a brief description about any changes made to this site since January 2011 that significantly impacted energy usage.		
Percent of Site Lighting Retrofitted: What percent of the site lighting was retrofitted? Describe whether it was almost all of the lighting or just certain areas.		%

Fields in this table will be populated as much as possible with data from the phone survey. However, any fields that are blank should be completed during the on-site verification. Any fields that are incorrect should also be corrected.

Electric Utility	PGE SCE SDGE SMUD LADWP OT _____		
Gas Utility	PGE SCG SDGE AllElec/None Propane LBGO SWG OT _____		
Is this premise owner-occupied (**O**) or leased (**L**)?	*CC4*	Revised	O
How many full-time equivalent employees work at this premise?	*FM070*	Revised	
What is the total occupied floor area of this premise? (exclude prkg garage)	*CC2a / CC2b* ft^2	Revised	_____ ft^2
-- If the premise has an enclosed parking garage, what is the floor area?	_____ ft^2		
What percent of the total floor area is heated or cooled?	*CC2c / CC2d* %	Revised	_____
How many buildings are part of this premise?			
What year was the majority of the facility built?	*CC8*	Revised	
Cooling Type: **1**=No A/C **2**=Split-System **3**=PkgRooftop **4**=PTAC/PTHP **5**=EvapCool **6**=Chiller **7**=IndivAC/HP **8**=WLHP **OT**=Other		Revised	
Heating Fuel Type: **1**=Electric **2**=Gas **3**=Both **4**=Propane **5**=None **OT**=Other		Revised	
What kind of site is this? **P** = Part of a bldg **B** = Single building **SM** = Small multi-building **CM** = Campus (multi-bldg, subsampled bldgs) **OT** = Other _____			
For single, stand-alone buildings or partial buildings: Number of stories/floors			

Premise-Level Schedule Definitions

Standard Holidays *(check all that apply)* ☐ N/A

Indicate below which, if any, standard holidays that the business is closed or operation deviates drastically from normal/typical operations, and indicate on Form BUS_HRS what the holiday operation hours are.

Indicate any additional holidays in the comment block.

New Year's Eve	☐	July 4th Celebrated	☐
New Year's Day	☐	Labor Day	☐
New Year's Day Celebrated	☐	Columbus Day	☐
Martin Luther King Day	☐	Veterans' Day	☐
Presidents' Day	☐	Thanksgiving	☐
St. Patrick's Day	☐	Thanksgiving Friday	☐
Easter Sunday	☐	Christmas Eve	☐
Memorial Day	☐	Christmas Day	☐
Flag Day	☐	Christmas Day Celebrated	☐
July 4th	☐	Caesar Chavez Day	☐
Other (1) _____	☐	Other (2)_____	☐

Seasonal Operation Periods ☐ N/A

Define seasonal operation periods for significant periods of time where business hours and/or equipment operation differs significantly from normal or typical business hours and/or equipment operation. To indicate seasonal operation periods, provide a brief description of the period (e.g. "spring break", "winter break", "summer break", "extended holiday hours"), and list the beginning/ending months (1-12) and days for up to three time periods.

Typical Schedule			Seasonal Time Period					
1			2			3		
Description			Description			Description		
Begin Month/Day			Begin Month/Day			Begin Month/Day		
End Month/Day			End Month/Day			End Month/Day		
Begin Month/Day			Begin Month/Day			Begin Month/Day		
End Month/Day			End Month/Day			End Month/Day		
Begin Month/Day			Begin Month/Day			Begin Month/Day		
End Month/Day			End Month/Day			End Month/Day		

Holiday and Seasonal Operation Comments:

Business Schedule

Primary Business Hours

Define typical operation for <u>all</u> Day Types listed below and specify hours in military time (00 to 24). For partial (i.e. not full) operation days, also indicate the approximate % of full operation as Partial Op %.

Day Type	From Phone Survey	Corrected Business Hours	Closed All Day?	Open 24 hrs?	PartialOp%
Monday	from _____ to _____	from _____ to_____			
Tuesday	from _____ to _____	from _____ to_____			
Wednesday	from _____ to _____	from _____ to_____			
Thursday	from _____ to _____	from _____ to_____			
Friday	from _____ to _____	from _____ to_____			
Saturday	from _____ to _____	from _____ to_____			
Sunday	from _____ to _____	from _____ to_____			
Holidays	from _____ to _____	from _____ to_____			

Seasonal Operation Business Hours – Time Period 2

Day Type	From Phone Survey	Corrected Business Hours	Closed All Day?	Open 24 hrs?	PartialOp%
Monday	from _____ to _____	from _____ to_____			
Tuesday	from _____ to _____	from _____ to_____			
Wednesday	from _____ to _____	from _____ to_____			
Thursday	from _____ to _____	from _____ to_____			
Friday	from _____ to _____	from _____ to_____			
Saturday	from _____ to _____	from _____ to_____			
Sunday	from _____ to _____	from _____ to_____			
Holidays	from _____ to _____	from _____ to_____			

Seasonal Operation Business Hours – Time Period 3

Day Type	Business Hours	Closed All Day?	Open 24 hrs?	PartialOp%
Monday	from _____ to_____	Y N	Y N	
Tuesday	from _____ to_____	Y N	Y N	
Wednesday	from _____ to_____	Y N	Y N	
Thursday	from _____ to_____	Y N	Y N	
Friday	from _____ to_____	Y N	Y N	

Saturday	from _____ to_____	Y N	Y N	
Sunday	from _____ to_____	Y N	Y N	
Holidays	from _____ to_____	Y N	Y N	

Activity Area Definitions

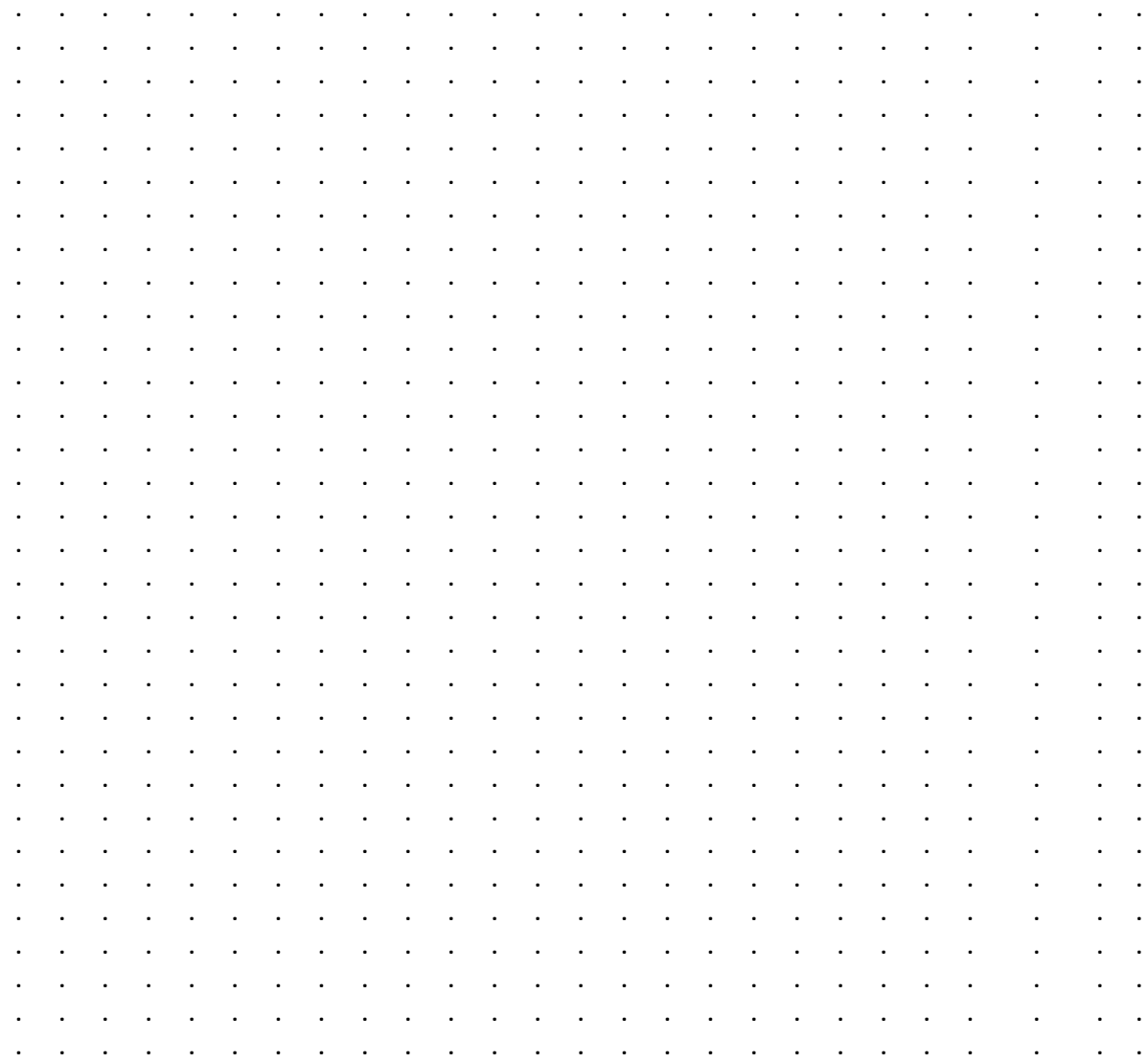
Activity Area ID# Assignments *Identify an Area ID# for each distinct Activity Area type within the surveyed area. Indicate each area on the Site Plan sketch, Form PREM_SKETCH. Also consider lighting system controls and operation when defining these areas.*

Area ID#	Activity Area Code (AA Code)	Surveyor's Description of Area (include floor and Bldg identifiers if needed)	% of Total Premise Floor Area	Windows or Skylights	Conditioned Space Type Code	Total Qty of this Area Type On-site
1				W S		
2				W S		
3				W S		
4				W S		
5				W S		
6				W S		
7				W S		
8				W S		
9				W S		
10				W S		
11				W S		
12				W S		
13				W S		
14				W S		
15				W S		
16				W S		
17				W S		
18				W S		
19				W S		
20				W S		
21				W S		
22				W S		
23				W S		
24				W S		
25				W S		

Conditioned Space Type Codes
CH = Cooled & Heated **CL** = Only Cooled **HT** = Only Heated **ECH** = EvapCooled & Heated **ECL** = Only EvapCool
NU = HVAC present but not used **RF** = Refrigerated **UN** = Unconditioned **OU** = Outside **OT** = Other (describe in comments)

Premise/Site-Plan Sketch

This sketch should provide a high-level view of the premise and its surroundings as it is actually configured. Attach site plans and floor plans available from other sources. Sketch all buildings and the closest streets/roadways in both directions. Mark the orientation of True North. Use multiple sheets/drawings if necessary. Also indicate the "front"or primary entrance for each building. A site map or site plans can be used in place of this, as long as streets can be shown.



Hourly Operation Schedules

Use this form if equipment operation is independent of Business Hours as indicated on Form BUS_HRS. Use one block for each end use. Indicate the applicable daytypes for each day type schedule, and account for all day types including holidays. Specify the % of max. occupancy or equipment-on for all time periods, and be sure to accurately capture transition periods. Pay attention to lighting control type as a separate schedule is needed for different control types.

Hour	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12

Schedule #___ End Use:_____ LtgCtrlType:_____ Description_____

Applicable		% Equipment On											
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												

Schedule #___ End Use:_____ LtgCtrlType:_____ Description_____

Applicable		% Equipment On											
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												

Schedule #___ End Use:_____ LtgCtrlType:_____ Description_____

Applicable		**%** Equipment On											
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												

Hourly Operation Schedules

Use this form if equipment operation is independent of Business Hours as indicated on Form BUS_HRS. Use one block for each end use. Indicate the applicable daytypes for each day type schedule, and account for all day types including holidays. Specify the % of max. occupancy or equipment-on for all time periods, and be sure to accurately capture transition periods. Pay attention to lighting control type as a separate schedule is needed for different control types.

Hour	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12

Schedule #___ End Use:_____ LtgCtrlType:_____ Description_____

Applicable		% Equipment On											
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												

Schedule #___ End Use:_____ LtgCtrlType:_____ Description_____

Applicable		% Equipment On											
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												

Schedule #___ End Use:_____ LtgCtrlType:_____ Description_____

Applicable		**%** Equipment On											
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												

Hourly Operation Schedules

Use this form if equipment operation is independent of Business Hours as indicated on Form BUS_HRS. Use one block for each end use. Indicate the applicable daytypes for each day type schedule, and account for all day types including holidays. Specify the % of max. occupancy or equipment-on for all time periods, and be sure to accurately capture transition periods. Pay attention to lighting control type as a separate schedule is needed for different control types.

Hour	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12

Schedule #___ End Use:_____ LtgCtrlType:_____ Description_____

Applicable		% Equipment On											
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												

Schedule #___ End Use:_____ LtgCtrlType:_____ Description_____

Applicable		% Equipment On											
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												

Lighting Logger Installation Form

Installation Date		**Extraction Date**	
Installer's Initials		**Extraction Initials**	
Scheduled Extraction Date			

Installation

Logger Serial Number					
Primary or Backup Logger?	P B	P B	P B	P B	P B
Placement Area ID# (ref only)					
Lighting Tech Type (HIM)	**CF LF HID LED HB**	**CF LF HID LED HB**	**CF LF HID LED HB**	**CF LF HID LED HB**	**CF LF HID LED HB**
Logger Placement on Fixture	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)
Placement Description Include building, floor, room #, etc. and be descriptive enough that it can be located for extraction.					
Schedule #					

Extraction

Logger Intact? See Legend Belo	**Y N L *P***	**Y N L *P***	**Y N L *P***	**Y N L *P***	**Y N L *P***
Logger Tested "OK" (On/Off)	**Y N** NA	**Y N** NA	**Y N** NA	**Y N** NA	**Y N** NA
% "ON" Time	%	%	%	%	%
Extraction Comments					
Logger Date&Time (HH:MM)					
Computer Date&Time (HH:MM)					
Alternate Extraction Date					

Logger Intact: "Y" – If logger is as originally installed, does not appear to be tampered with, and display indicates the logger is working **Logger Tested "OK"** – If Logger Intact was "Y" then is it properly logging the light ON/OFF, "Y" or "N"? If Logger Intact was "N" use "NA"

Lighting Logger Installation Form (continued)

Use this table to record information for installed measurement devices such as lighting loggers.

Installation

Logger Serial Number					
Primary or Backup Logger?	P B	P B	P B	P B	P B
Placement Area ID# (ref only)					
Lighting Tech Type (HIM)	**CF LF HID LED HB**	**CF LF HID LED HB**	**CF LF HID LED HB**	**CF LF HID LED HB**	**CF LF HID LED HB**
Logger Placement on Fixture	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)
Placement Description Include building, floor, room #, etc. and be descriptive enough that it can be located for extraction.					
Schedule #					

Extraction

Logger Intact? (L=Lost/missing)	**Y N L *P***	**Y N L *P***	**Y N L *P***	**Y N L *P***	**Y N L *P***
Logger Tested "OK" (On/Off)	**Y N** NA	**Y N** NA	**Y N** NA	**Y N** NA	**Y N** NA
% "ON" Time	%	%	%	%	%
Extraction Comments					
Logger Date&Time (HH:MM)					
Computer Date&Time (HH:MM)					
Alternate Extraction Date					

Logger Intact: "Y" – If logger is as originally installed, does <u>not</u> appear to be tampered with, and display indicates the logger is working

Logger Tested "OK" – <u>If Logger Intact is "Y"</u> then is it properly logging the light ON/OFF, "Y" or "N"? <u>If Logger Intact is "N"</u> use "NA"

Lighting Logger Installation Form (continued)

Installation

Logger Serial Number					
Primary or Backup Logger?	P B	P B	P B	P B	P B
Placement Area ID# (ref only)					
Lighting Tech Type (HIM)	**CF LF HID LED HB**	**CF LF HID LED HB**	**CF LF HID LED HB**	**CF LF HID LED HB**	**CF LF HID LED HB**
Logger Placement on Fixture	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)
Placement Description Include building, floor, room #, etc. and be descriptive enough that it can be located for extraction.					
Schedule #					

Extraction

Logger Intact? (L=Lost/missing)	**Y N L** ***P***	**Y N L** ***P***	**Y N L** ***P***	**Y N L** ***P***	**Y N L** ***P***
Logger Tested "OK" (On/Off)	**Y N** NA	**Y N** NA	**Y N** NA	**Y N** NA	**Y N** NA
% "ON" Time	%	%	%	%	%
Extraction Comments					
Logger Date&Time (HH:MM)					
Computer Date&Time (HH:MM)					
Alternate Extraction Date					

Logger Intact: "Y" – If logger is as originally installed, does not appear to be tampered with, and display indicates the logger is working

Logger Tested "OK" – If Logger Intact is "Y" then is it properly logging the light ON/OFF, "Y" or "N"? If Logger Intact is "N" use "NA"

Lighting Logger Installation Form (continued)

Installation

Logger Serial Number					
Primary or Backup Logger?	P B	P B	P B	P B	P B
Placement Area ID# (ref only)					
Lighting Tech Type (HIM)	**CF LF HID LED HB**	**CF LF HID LED HB**	**CF LF HID LED HB**	**CF LF HID LED HB**	**CF LF HID LED HB**
Logger Placement on Fixture	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)	**I**(nt) **E**(xt) **O**(ther)
Placement Description Include building, floor, room #, etc. and be descriptive enough that it can be located for extraction.					
Schedule #					

Extraction

Logger Intact? (L=Lost/missing)	**Y N L *P***	**Y N L *P***	**Y N L *P***	**Y N L *P***	**Y N L *P***
Logger Tested "OK" (On/Off)	**Y N** NA	**Y N** NA	**Y N** NA	**Y N** NA	**Y N** NA
% "ON" Time	%	%	%	%	%
Extraction Comments					
Logger Date&Time (HH:MM)					
Computer Date&Time (HH:MM)					
Alternate Extraction Date					

Logger Intact: "Y" – If logger is as originally installed, does <u>not</u> appear to be tampered with, and display indicates the logger is working

Logger Tested "OK" – <u>If Logger Intact is "Y"</u> then is it properly logging the light ON/OFF, "Y" or "N"? <u>If Logger Intact is "N"</u> use "NA"

Indoor/Outdoor LED Lamp Lighting Measures

IOU Tracking Data	Measure Category	LED_MeasCategory	
	Engineering Estimation Method	LED_EngEstMethod	
	Measure Code	LED_OS_MeasCode	
	Measure Name	LED_OS_MeasName	
	Rebated #of Units	LED_IOUUnitQtyRebated	
	IOU Unit Basis	LED_IOUUnitBasis	
	Correct Unit Basis (only if incorrect above)		
	Can Rebated measures be clearly identified?	Y N	
Visual Verification Data	Inside or outside lighting?	**I O**	
	Total number of fixtures		
	Number of lamps per fixture		
	Total number of lamps		
	Ltg Application Type Code		
	Fixture Mount Type Code		
	Ltg Control Code		
	Multilevel: Fixture or Lamp switched?	**Y N**	
Verification Counts	**(A) Installed & Operational # of units (ex post quantity)**		
	-- Was subsampling or estimation used?	**Y N**	
	-- # of lamps burned out in partial operation fixtures		
	(B) # of Non-Operable (broken/entire fixture burned-out) Units in place		
	(C) # of Units in Storage/Spares		
	-- Utility rebate sticker observed on packages?	**Y N**	
Physical Inspection Data	*Lamps/fixtures are NOT accessible (Check box & explain in comments)*	☐	
	Number of units physically inspected		
	*If more than one type	**Primary**	***Secondary**
	Lamp Wattage		
	Make/Manufacturer		
	Model/Lamp Code		
	Lamp Shape/Features Code		
	Lamp Base Type Code:	**P M C I MO ADP GU24 OT**	**P M C I MO ADP GU24 OT**
	Installed and OP # of lamps		
Baseline System Summary Data (Observed or Self-Reported)	Is post-installation operation the same as pre-retrofit operation?	**Y N**	**B SC E**
	-- If pre-retrofit operation was different, specify Sched #		
	Lamp Type Code		**B SC E**
	Watts per lamp		**B SC E**
	Number of lamps per fixture		**B SC E**
	Observed versus Rebated # of Units is: E=Equal M=More L=Less OT (describe)		**E M L OT**
If Disposition Not Equal: Site Contact/Self-Report Questions	Self-Reported # of rebated units onsite (probe for rebated under 10-12)		
	Others purchased since rebated units installed		
	(D) # of units located at Other Affiliated Sites		

Baseline Sources:

- **B** – Baseline equipment (includes physical inspection, documentation, or building/energy management system)
- **SC** – Site Contact
- **E** – Engineering estimate

Failed (and Replaced) Rebated Units (Indirect/Self-Report)	How long did units typically operate before failure (months)?	
	(E) # of rebated units that Failed, but replaced w/ incandescent	
	# of rebated units that Failed but were replaced in-kind (Ref)	
Removed Rebated Units (Indirect/Self-	**(F)** # of rebated units that were Removed and not replaced	
	-- When were the units removed? (month/year if possible)	
	-- Describe why units were removed **in comments**	
	(Sum A-F) Total # of units accounted for on-site	**(reqd)**
Total # of units (A-F) MORE than Rebated # of Units	# that were rebated by other programs/projects?	
	# that were obtained from OTHER means (explain in comments)?	
Total # of units (A-F) LESS than Rebated # of Units	# of rebated units, other site contact explanation (note in comments)	
	# of rebated units, unaccounted for	

LED – Activity Area Assignment Table

Measure Code:_____

Use this table to associate LED # of units to Activity Areas, equipment operation schedules, and lighting loggers. The values in the "Represented # of Units" column must add up to the total # of installed and operational units in the table above.

Area ID #	Sched #	Item #	Primary or Secondary Type	Control type Code	Repres. # of Units	% of Total Inst&Op. Units (Ref)	Primary Logger S/N	Ref. Logger	Back-up Logger S/N	Comments
			P S			%		☐		
			P S			%		☐		
			P S			%		☐		
			P S			%		☐		
			P S			%		☐		
			P S			%		☐		
			P S			%		☐		
			P S			%		☐		
			P S			%		☐		
			P S			%		☐		
			P S			%		☐		
			P S			%		☐		
			P S			%		☐		
			P S			%		☐		
			P S			%		☐		
			P S			%		☐		

		%	<= Totals # of Installed & Operational Units check *(no data entry)*

Comments:_____
_____
_____
_____
_____
_____

Baseline Characterization

Please describe why these lights were changed to LEDs instead of any other lighting technology	

Approximate age of existing lighting system prior to retrofit (years)	
Condition of original fixtures prior to retrofit (**G**ood, **F**air, **P**oor)	**G F P**
What % of original fixtures were completely burned out?	
What % of original fixtures were partially burned out?	
On a scale of 1-10, Please rate the following topics on their level of influence for retrofitting the lighting	
Burned out fixtures	
Adequate lighting levels	
Major Renovation / Re-Modeling	
Safety of Occupants	
Productivity of Occupants	
Lowering energy consumption and energy bills	
Long lamp life	
Low maintenance	
Going green	
Utility Incentive	
Other (*describe in comments*)	
Considering all of the influential factors above, in the absence of an energy efficiency rebate program: How long would you have continued to operate the original fixtures before replacing	

Comments: _____
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Indoor/Outdoor LED Hardwired Fixture Lighting Measures

IOU Tracking Data	Measure Category	LEDFixture _MeasCategory		
	Measure Code	LEDFixture _*OS_MeasCode*		
	Measure Name	LEDFixture_OS_MeasName		
	Rebated #of Units	LEDFixture _IOUUnitQtyRebated		
	IOU Unit Basis	*LEDFixture_IOUUnitBasis*		
	Correct Unit Basis (if incorrect above above)			
	Can Rebated measures be clearly identified?	Y N		
Visual Verification Data	Inside or outside lighting?	**I O**		
	Ceiling height in ft			
	Fixture height from floor in ft			
	Ltg Application Code			
	Fixture Mount type code			
	Total number of fixtures			
	If LED Linear Tubes or Track lighting fixtures: Fixture Replacement or Lamp Replacement	**FR LP**		
	If LED Linear Tubes or Track lighting fixtures: PREDOMINANT # Lamps per Fixture			
	If LED Linear Tubes or Track lighting fixtures: Total number of lamps			
	Lamp Shape/Features Code			
	If LED **bar, strip, string, or tape**: Provide length (ft)			
	If LED **panel/head**: Provide dimensions (length X width in ft)	Length		
	If LED **linear fixture:** Fixture dimensions (length X width in ft)	Length		
	and Tube length (ft)			
	Multilevel: Fixture or Lamp switched?	**Y N**		
Verification Counts	**(A) Installed & Operational # of units (ex post quantity)**			
	-- Was sub sampling or estimation used?	**Y N**		
	-- # of lamps burned out in partial operation fixtures			
	(B) # of Non-Operable (broken/entire fixture burned-out) Units in place			
	(C) # of Rebated Units in Storage/Spares			
Physical Inspection Data	*Check box if Fixtures are NOT accessible (explain in comments)*	☐		
	Number of units physically inspected			
	If the Unit Basis = Lamp: Provide Lamp information instead of Fixture info: Fixture Wattage:			
	Fixture Make/Manufacturer			
	Fixture Model Number			
Baseline System Summary	Is post-installation operation the same as pre-retrofit	**Y N**	**B SC E**	
	-- If pre-retrofit operation was different, specify Sched #			
	Control type Code		**B SC E**	
	Lamp Type Code		**B SC E**	
	(If LF Baseline) - Tube Length and Diameter (e.g. 4ft T12)		**B SC E**	
	# Lamps/Fixture		**B SC E**	
	Lamp Wattage		**B SC E**	
	If **NOT** LF Baseline: Fixture Description (i.e. unique characteristics)		**B SC E**	
Observed versus Rebated # of Units is: E=Equal M=More L=Less OT (describe)			**E M L OT**	

Baseline Sources:

- **B** – Baseline equipment (includes physical inspection, documentation, or building/energy management system)
- **SC** – Site Contact
- **E** – Engineering estimate

If Disposition Not Equal: Site Contact/Self-Report Questions	Self-Reported # of rebated units onsite (probe for rebated under 10-	
	Others purchased since rebated units installed	
	(D) # of units located at Other Affiliated Sites	
Failed (and Replaced) Rebated Units (Indirect/Self-Report)	How long did units typically operate before failure (months)?	
	(E) # of rebated units that Failed, but were replaced w/different tech	
	# of rebated units that Failed but were replaced in-kind (Ref)	
Removed Rebated Units (Indirect/Self-Report)	**(F)** # of rebated units that were Removed and not replaced	
	-- When were the units removed? (month/year if possible)	
	-- Describe why units were removed **in comments**	
	(Sum A-F) Total # of units accounted for on-site	**(reqd)**
Total # of units (A-F) MORE than Rebated # of Units	# that were rebated by other programs/projects?	
	# that were obtained from OTHER means (explain in comments)?	
Total # of units (A-F) LESS than Rebated # of Units	# of rebated units, other site contact explanation (note in	
	# of rebated units, unaccounted for	

LED Fixture - Activity Area Assignment Table (AAAT) Measure Code: _____

*Use the AAAT below to associate lighting units to Activity Areas, equipment oper. Schedules, and lighting loggers. The values in the "Represented # of Units" column must add up to the **total # of Installed and Operational** units in the table above.*

- *If ONLY FIXTURE **DENT LL**: Only fill out **AAAT** below.*
- *If **DENT LL & (DENT CT or HOBO)**: Fill out **AAAT** with logger info **&** the **HIGHBAY** Form for Panel Metering*
- *If ONLY **PANEL METERING**: Check **N/A** box and only fill out **HIGHBAY** Form.*

***Circle all that apply:** (If Verify Only, circle 'NA', and fill out AAAT)*

Metering Type:	DENT LL	DENT CT	HOBO	NA

N/A

Area ID #	Sched #	Item #	Control Type Code	Repres. # of Units	% of Total Inst&Op. Units (Ref)	Primary Logger S/N	Ref. Logger	Back-up Logger S/N	Comments
					%		☐		
					%		☐		
					%		☐		
					%		☐		
					%		☐		
					%		☐		
					%		☐		
					%		☐		
					%		☐		
					%		☐		
					%		☐		
					%	<= Total # of Installed & Operational Units check *(no data entry)*			

Baseline Characterization

Please describe why these lights were changed to LEDs instead of any other lighting technology	

Approximate age of existing lighting system prior to retrofit (years)	
Condition of original fixtures prior to retrofit (**G**ood, **F**air, **P**oor)	**G F P**
What % of original fixtures were completely burned out?	
What % of original fixtures were partially burned out?	
On a scale of 1-10, Please rate the following topics on their level of influence for retrofitting the lighting	
Burned out fixtures	
Adequate lighting levels	
Major Renovation / Re-Modeling	
Safety of Occupants	
Productivity of Occupants	
Lowering energy consumption and energy bills	
Long lamp life	
Low maintenance	
Going green	
Utility Incentive	
Other (*describe in comments*)	
Considering all of the influential factors above, in the absence of an energy efficiency rebate program: How long would you have continued to operate the original fixtures before replacing	

General Comments

Item #	Form Name	Comments

Site Photo Log

Record site photo information here including the PhotoID (i.e. digital file name) and a brief description of the photo where needed. Site Photos should include the site entrance and entire building, rebated measures, and close-up photos of nameplates, lamp codes, and other make/model identification. Refer to the training manual for more on what photos to take. Photo/file naming conventions is SiteID_Item# or SiteID 00# (e.g. PGE_056789_1.jpg, PGE_056789 001.jpg).

Item #	Description/Comments/Measure Code *(no data entry)*
1	
2	
3	
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APPENDIX C SELF-REPORT AND BUSINESS HOUR METHODOLOGY

Are the Lights Really ON? Leveraging a Cost Effective Approach to Estimate Lighting Usage in Nonresidential Buildings

David Gonzales, Itron, Inc., San Diego, CA

Brian McAuley, Itron, Inc., San Diego, CA

ABSTRACT

There are a number of methods by which lighting usage can be estimated within nonresidential buildings. These methods range from the inexpensive, but less accurate – utilizing a facility's business hour schedule – to the more efficient, but more costly – installing onsite monitoring equipment. The difficulty with the first approach is that it ignores the variability in a facility's lighting load shape throughout open hours and does not capture any usage during closed hours or shoulder hours, which generally refer to the hours just before opening and right after closing. The latter approach involves extensive on-site visits that involve the installation of monitoring equipment over a long period of time.

This paper will discuss the methods and findings that were developed from comparing business hours and customer self-reported lighting usage to actual monitored lighting data. These results will provide evaluators with two cost effective methods for obtaining accurate lighting usage estimates within nonresidential buildings. With the self-report method, a ratio (or adjustment factor) of actual logger to self-report usage has been developed for linear and non-linear technologies at the building type and activity area level throughout open business hours. With the second approach, a usage rate (based on actual logger data) has been developed for three periods outside of open hours – an open/closed shoulder rate and a closed rate.

Introduction

This paper discusses methods that evaluators can leverage which are cost effective alternatives to installing onsite monitoring equipment to estimate lighting usage in nonresidential buildings. The paper relies on the results that were garnered from three extensive evaluation studies that were conducted within California. The onsite data collection effort for these studies included the installation of over 3,200 loggers monitoring CFLs and LEDs at more than 900 sites and roughly 5,000 loggers monitoring linear fluorescents at almost 900 sites. Along with the installation of monitoring equipment, auditors also collected business hour schedules from the site contact, including seasonal and holiday hours as well as hourly self-reported estimates of lighting usage by activity area.

This paper will discuss the methods and findings that were developed from comparing business hours and self-reported lighting usage to actual monitored lighting usage. With the self-report method, a ratio (or adjustment factor) of actual logger to self-report usage has been developed for each technology, building type and activity area throughout open business hours. With the second approach, a usage rate (based on actual logger data) has been developed for three periods outside of open hours – an open/closed shoulder rate, which is defined as two hours prior to opening and two hours after close and a closed rate, which is defined as all closed hours not within the shoulder hours.

Background

This paper leverages a method for estimating lighting usage in nonresidential buildings that was first presented at the 2011 IEPEC conference, *"Is the Customer Always Right? Two Cost-Effective Methods for Determining Lighting Usage in Commercial Buildings"* and expands upon those findings by including additional logger data that were collected for three impact evaluations prepared by Itron, Inc. for the California Public Utilities Commission – *2006-2008 Small Commercial Contract Group Direct Impact Evaluation Report* (Sm Com)[1], *2010-2012 Nonresidential Downstream Lighting Impact Evaluation* (NRL)[2] and *2010-2012 LED Impact Evaluation* (LED)[3]. The primary purpose of those studies was to evaluate the California investor owned utilities' energy efficiency claims for each of the program periods detailed above. Each of these evaluations involved an extensive statewide phone survey effort and on-site verification as well as time-of-use data collection for several high impact lighting measures, including CFLs, LEDs and linear technologies installed in nonresidential buildings.

Data Sources

The three main sources of on-site data that were used in this paper from the evaluations detailed above were participant business hours, participant self-reported lighting usage and lighting logger data. Participant business hours were collected as part of the initial phone survey and were confirmed by an auditor at the time of the on-site visit. In order to capture any variability in business hour operations throughout the year, the auditor not only collected the open and close time for each day of the week, but they also captured any seasonal operations and holiday schedules.

Self-reported lighting usage was gathered at the time of the on-site visit. Since different activity areas[4] within a building generally have different lighting usage schedules, the site contact was asked to estimate

[1] The Small Com Report can be found at www.CALMAC.org. Study ID: CPU0019.01.

[2] The NRL Report can be found at www.CALMAC.org. Study ID: CPU0078.01.

[3] The LED Report can be found at www.CALMAC.org. Study ID: CPU0101.01.

[4] Activity areas are defined as areas within the facility that have different occupancy and usage patterns. For example, the restroom(s) in a retail establishment may have a different usage pattern throughout business hours than the retail sales area.

the operating schedules for each of the activity areas where rebated measures were installed. The site contact was the individual who met with the surveyor onsite and, typically, was most knowledge about the facility's operations. These self-reported operating hours were collected as the percent of time "ON" per hour for each hour in each day of the week.

The time-of-use data were obtained through the installation of lighting loggers. A technical description of the lighting loggers and the installation/extraction procedures can be found in the NRL Report, Appendix G. Lighting loggers using optical sensors were the predominant type used for these studies, however, when lighting was not accessible, logging was done at the electrical panel where circuit amperage could be collected in order to develop lighting load shapes. As part of the on-site visit, surveyors attempted to log every representative activity area where rebated measures were installed. These loggers were generally in the field for anywhere from four weeks to one year.

Processing of Data

After the loggers were extracted, the data was processed into a percent "ON" per hour format such that the actual lighting usage for each activity area could be compared to the business and self-reported hours of operation. Figure 1 provides a site-specific example of those comparisons. The figure presents the average logger data collected for a typical weekday in the office area of an office building. The vertical axis represents the percent "ON" per hour for that day. The business hours have a value of one when the office building is open and a value of zero during closed hours. Likewise, the site contact self-reported that the lighting within the office area was "ON" eighty percent of the time throughout the open hours.

FIGURE 1: ACTUAL, SELF-REPORTED LIGHTING USAGE AND BUSINESS HOURS FOR A LOGGER MONITORING AN OFFICE

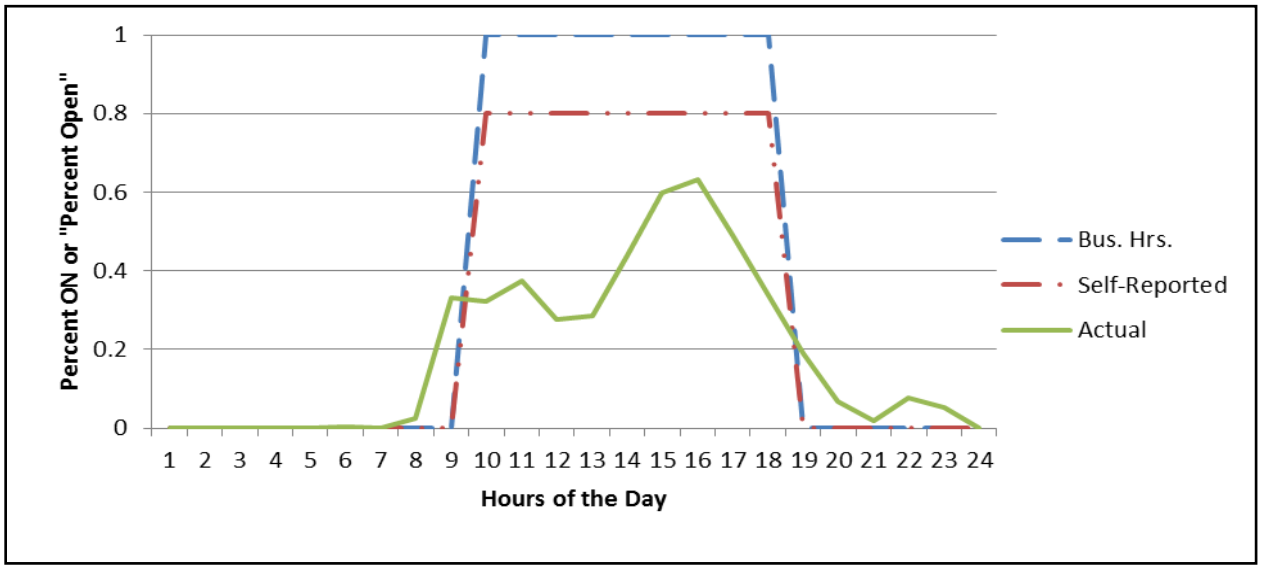


Figure 1 reveals a few important distinctions that, ultimately, represent the motivation behind this analysis. The first is that business hours may not be a reliable proxy to use in developing usage shapes and lighting load impacts. Customer self-reported lighting usage, which was garnered from the on-site visit, is 20% less than business hour estimates throughout the open period. The second is that actual lighting usage, which was garnered from monitoring data, is much less than both business hour and self-report estimates throughout open hours and there is significant hourly variability throughout that time frame. The third is that business hours and self-reports (in this case) do not account for any lighting usage throughout time periods prior to open or after close.

However, the intent of this analysis was not to accurately predict lighting usage at a single site, but rather for a large sample of similar technologies, building types and space types. In order to aggregate these adjustments and usage rates, logger data was compared to the business hours of the facility and each self-reported schedule at the facility. As mentioned above, for each hour in each day, four usage periods were generated for each facility – Open, Open Shoulder, Closed Shoulder and Closed. The actual and self-reported usage rates were then calculated for each logger by use period within the site and each logger was aggregated to a site-activity area level by measure. This aggregation only occurred when there was more than one logger installed in similar space types. The aggregation from individual loggers to activity areas was done based on the number of lamps that each logger was monitoring.

Results

Two sets of data were generated from the analysis detailed above – usage rates and adjustment factors. The results from the usage rates can be applied by knowing business operating hours, building type and activity areas and, in the case of the adjustment factors, by knowing the customer self-reported operating schedules which is typically gathered from on-site data collection.

Business Hour Rates

The business hour rates represent the actual average usage found in the logger sample for each use period by technology, building type and activity area. The usage rate represents a constant factor than can be applied to all hours within each use period and includes data from normal operation schedules as well as seasonal operations, where applicable. If a participant had more than one business operating schedule and logger data was collected during those times, the single hourly average usage rate for that logger (for each use period) was developed by weighting the number of days in the year represented in each schedule. Each individual logger was then weighted by the total number of lamps represented by the logger along with the total number of hours associated with each use period.

Table 1 and Table 2 present the results from that aggregation. Building type-activity area combinations for which at least 6 sites were monitored are included in these tables. The "Other" building type and "Other Miscellaneous" activity area represent all the unique building type or building type-space types where there were less than 6 sites represented in the sample.

Self-Report Adjustment Factors

The adjustment factor represents the actual monitored usage divided by the self-reported use. Again, these ratios were generated at the technology, building type and activity area level much like the business hour rates, but are applied only for the open period. The reason why adjustment factors were not developed for the shoulder and closed periods is that self-reported usage was often claimed to be zero during these periods. A zero value cannot be adjusted by a multiplicative factor, therefore a constant factor is more appropriate when analyzing the closed and shoulder periods.

Table 1 and Table 2 present the results associated with the adjustment factor analysis. The self-reported usage can then be multiplied by the adjustment factor to generate a proxy percent "ON" value throughout the open hours by technology, building type and activity area. Also presented are the averages by technology and building type alone.

TABLE 1: SELF-REPORTED ADJUSTMENT FACTORS – NON-LINEAR FLUORESCENT

Building Type	Activity Area	Number of Sites	Self-Reported Adjustment		Business Hour Usage Rates		
			Self-Reported Usage	Adjustment Factor	Open Shoulder	Closed Shoulder	Closed
Assembly	Classroom	8	9%	0.53	0.00	0.03	0.01
	Dining	15	57%	0.88	0.25	0.34	0.16
	HallwayLobby	67	69%	0.87	0.35	0.32	0.16
	Kitchen/Break Room	15	34%	0.58	0.14	0.15	0.06
	Office	28	67%	0.53	0.07	0.14	0.05
	OtherMisc	34	58%	0.85	0.18	0.23	0.10
	Recreation	16	39%	0.40	0.05	0.10	0.04
	Religious Worship	31	25%	0.64	0.04	0.09	0.03
	Restrooms	53	35%	0.84	0.18	0.23	0.11
	Storage	38	27%	0.88	0.11	0.11	0.05
	All	**119**	**50%**	**0.79**	**0.17**	**0.21**	**0.09**
Education – Primary/Secondary	OtherMisc	15	70%	0.68	0.04	0.14	0.04
	Restrooms	17	38%	0.97	0.06	0.09	0.03
	Storage	6	28%	0.34	0.02	0.04	0.02
	All	**26**	**60%**	**0.71**	**0.05**	**0.12**	**0.04**
Grocery	OtherMisc	7	70%	0.98	0.64	0.13	0.04
	Storage	6	36%	1.54	0.10	0.10	0.02
	All	**9**	**56%**	**1.13**	**0.43**	**0.12**	**0.04**
Health/Medical-Clinic	Comm/Ind Work	6	36%	0.12	0.00	0.01	0.00
	HallwayLobby	47	82%	0.79	0.29	0.36	0.15
	Kitchen/Break Room	8	43%	0.95	0.75	0.82	0.21
	Office	28	85%	0.49	0.11	0.19	0.03
	OtherMisc	12	55%	0.26	0.04	0.11	0.03
	Restrooms	32	15%	1.04	0.03	0.05	0.01
	Storage	13	9%	3.82	0.06	0.05	0.05
	All	**77**	**52%**	**0.42**	**0.24**	**0.30**	**0.10**
Lodging	Comm/Ind Work	13	28%	1.14	0.05	0.01	0.01
	Dining	10	70%	0.91	0.06	0.18	0.07
	Guest Rooms	93	34%	0.24	0.10	0.05	0.07
	HallwayLobby	55	81%	0.87	0.21	0.19	0.25
	Kitchen/Break Room	12	51%	0.67	0.40	0.27	0.13
	Office	13	81%	0.42	0.05	0.09	0.07
	OtherMisc	13	46%	1.18	0.02	0.06	0.09
	Restrooms	39	32%	0.22	0.16	0.15	0.09
	Storage	13	27%	0.70	0.43	0.22	0.14
	All	**109**	**38%**	**0.36**	**0.11**	**0.08**	**0.08**

Building Type	Activity Area	Number of Sites	Self-Reported Adjustment		Business Hour Usage Rates		
			Self-Reported Usage	Adjustment Factor	Open Shoulder	Closed Shoulder	Closed
Office – Large	HallwayLobby	21	86%	0.85	0.28	0.69	0.42
	Office	6	90%	0.69	0.34	0.44	0.25
	OtherMisc	8	41%	0.68	0.05	0.15	0.08
	Restrooms	11	30%	1.82	0.24	0.37	0.13
	All	**28**	**72%**	**0.87**	**0.26**	**0.53**	**0.31**
Office - Small	Conference Room	9	29%	0.87	0.06	0.11	0.01
	HallwayLobby	47	73%	0.76	0.29	0.33	0.15
	Kitchen/Break Room	12	44%	0.85	0.06	0.08	0.03
	Office	39	82%	0.76	0.07	0.25	0.03
	OtherMisc	13	50%	0.71	0.45	0.17	0.28
	Restrooms	90	19%	0.93	0.06	0.08	0.03
	Storage	22	33%	0.66	0.13	0.14	0.03
	All	**151**	**55%**	**0.77**	**0.16**	**0.20**	**0.08**
Other	OtherMisc	22	54%	0.83	0.24	0.24	0.37
	All	**22**	**54%**	**0.83**	**0.24**	**0.24**	**0.37**
Other Industrial	HallwayLobby	14	88%	0.82	0.13	0.21	0.04
	Office	11	81%	0.57	0.03	0.09	0.04
	OtherMisc	9	48%	0.74	0.19	0.19	0.09
	Restrooms	29	13%	1.32	0.08	0.04	0.01
	Storage	7	25%	0.49	0.06	0.06	0.02
	All	**49**	**63%**	**0.73**	**0.09**	**0.12**	**0.04**
Restaurant	Dining	101	87%	0.91	0.24	0.32	0.06
	HallwayLobby	43	82%	0.80	0.43	0.38	0.29
	Kitchen/Break Room	33	93%	0.90	0.49	0.33	0.11
	Office	16	35%	1.16	0.29	0.27	0.12
	OtherMisc	8	62%	0.92	0.39	0.23	0.12
	Restrooms	70	52%	0.98	0.31	0.31	0.14
	RetailSales	10	94%	0.80	0.40	0.52	0.31
	Storage	54	42%	1.11	0.28	0.19	0.09
	All	**170**	**82%**	**0.90**	**0.30**	**0.34**	**0.12**
Retail – Large	Office	4	97%	0.98	0.61	0.13	0.03
	OtherMisc	6	90%	0.96	0.39	0.51	0.27
	Restrooms	13	35%	1.35	0.25	0.26	0.13
	RetailSales	23	95%	1.02	0.20	0.10	0.02
	Storage	8	33%	0.25	0.07	0.05	0.06
	All	**39**	**95%**	**1.02**	**0.20**	**0.10**	**0.02**

Building Type	Activity Area	Number of Sites	Self-Reported Adjustment		Business Hour Usage Rates		
			Self-Reported Usage	Adjustment Factor	Open Shoulder	Closed Shoulder	Closed
Retail – Small	Auto Repair Workshop	6	80%	0.63	0.19	0.29	0.15
	Comm/Ind Work	9	80%	0.82	0.16	0.06	0.02
	HallwayLobby	23	85%	0.63	0.30	0.28	0.17
	Kitchen/Break Room	9	40%	0.62	0.12	0.13	0.09
	Office	28	64%	1.19	0.39	0.37	0.28
	OtherMisc	14	72%	0.58	0.15	0.19	0.02
	Restrooms	126	15%	1.16	0.05	0.06	0.03
	RetailSales	98	87%	0.98	0.31	0.19	0.09
	Services	9	96%	0.91	0.34	0.43	0.17
	All	**227**	**79%**	**0.96**	**0.27**	**0.19**	**0.10**
Warehouse	OtherMisc	11	83%	0.72	0.10	0.21	0.07
	Restrooms	15	6%	0.90	0.01	0.01	0.00
	All	**24**	**62%**	**0.73**	**0.08**	**0.17**	**0.06**

The results from the adjustment factor analysis for non-linear technologies (CFLs and LEDs) reveal that site contacts generally over-estimate lighting usage in their facilities for most building types. For example, the average overall self-reported lighting usage throughout open hours in office – small was 55%. However, the overall adjustment factor is .77, which reveals that actual usage, on average, was roughly 25 % lower.[5] For retail – large, site contacts were generally accurate in predicting usage throughout open hours (1.02 adjustment factor). This was driven predominantly by an almost identical self-report to actual in retail sales areas.

The results from the usage rate analysis reveal that facilities experience measured lighting loads throughout closed hours. The most significant loads come during the two hours prior to opening and two hours after close (the shoulder periods). For example, the average usage for restaurants for each hour in the open and closed shoulder period was .30 and .34, respectively. Likewise, the usage rate throughout all other closed hours was .12 with the most significant load being generated in retail sales areas and hallways/lobbies.

[5] A 42% actual divided by the 55% self-report yields an adjustment factor of .77 throughout open hours.

TABLE 2: SELF-REPORTED ADJUSTMENT FACTORS – LINEAR FLUORESCENT

Building Type	Activity Area	Number of Sites	Self-Reported Adjustment		Business Hour Usage Rates		
			Self-Reported Usage	Adjustment Factor	Open Shoulder	Closed Shoulder	Closed
Assembly	Classroom	30	64%	0.47	0.05	0.12	0.02
	Conference Room	7	55%	0.55	0.14	0.27	0.06
	Dining	14	63%	0.64	0.27	0.11	0.06
	HallwayLobby	32	91%	0.42	0.17	0.33	0.13
	Kitchen/Break Room	31	43%	0.83	0.18	0.22	0.07
	Office	43	66%	0.57	0.26	0.20	0.06
	OtherMisc	28	91%	0.61	0.35	0.33	0.20
	Recreation	21	75%	0.63	0.11	0.26	0.06
	Religious Worship	8	30%	0.31	0.05	0.06	0.04
	Restrooms	23	47%	1.45	0.42	0.47	0.28
	Storage	24	45%	0.78	0.37	0.36	0.15
	All	**70**	**76%**	**0.57**	**0.21**	**0.26**	**0.11**
Education – Primary/Secondary	Classroom	48	76%	0.67	0.03	0.14	0.02
	HallwayLobby	24	78%	1.00	0.22	0.45	0.16
	Kitchen/Break Room	22	62%	0.98	0.22	0.26	0.07
	Office	32	76%	0.91	0.13	0.25	0.06
	OtherMisc	24	76%	0.74	0.11	0.37	0.06
	Restrooms	23	46%	1.24	0.10	0.22	0.04
	Storage	11	10%	1.49	0.02	0.12	0.02
	All	**59**	**74%**	**0.72**	**0.07**	**0.20**	**0.04**
Grocery	OtherMisc	6	84%	0.71	0.09	0.29	0.09
	RetailSales	14	95%	1.01	0.54	0.31	0.16
	Storage	7	73%	0.97	0.33	0.22	0.15
	All	**14**	**91%**	**0.96**	**0.45**	**0.30**	**0.15**
Health/Medical-Clinic	Comm/Ind Work	15	81%	0.79	0.06	0.30	0.04
	HallwayLobby	40	91%	0.89	0.24	0.46	0.18
	Kitchen/Break Room	19	68%	0.87	0.21	0.37	0.05
	Office	44	69%	0.83	0.17	0.29	0.06
	OtherMisc	17	77%	0.52	0.05	0.27	0.01
	Patient Rooms	10	28%	0.51	0.06	0.20	0.02
	Restrooms	15	22%	1.38	0.07	0.17	0.06
	Storage	18	32%	1.18	0.02	0.06	0.02
	All	**54**	**75%**	**0.73**	**0.15**	**0.32**	**0.08**
Laundry	OtherMisc	7	100%	0.93	0.54	0.52	0.34
	All	**7**	**100%**	**0.93**	**0.54**	**0.52**	**0.34**

Building Type	Activity Area	Number of Sites	Self-Reported Adjustment		Business Hour Usage Rates		
			Self-Reported Usage	Adjustment Factor	Open Shoulder	Closed Shoulder	Closed
Office - Large	Comm/Ind Work	6	88%	0.74	0.37	0.54	0.24
	Conference Room	13	33%	0.92	0.04	0.09	0.04
	HallwayLobby	16	94%	0.85	0.43	0.48	0.26
	Kitchen/Break Room	12	82%	0.93	0.36	0.52	0.23
	Office	22	90%	0.77	0.42	0.55	0.25
	OtherMisc	10	44%	1.00	0.32	0.38	0.27
	Storage	11	55%	0.99	0.10	0.12	0.11
	All	**26**	**82%**	**0.80**	**0.39**	**0.51**	**0.24**
Office - Small	Comm/Ind Work	17	79%	0.77	0.14	0.22	0.10
	Conference Room	22	58%	0.80	0.17	0.17	0.02
	Copy Room	11	80%	0.96	0.24	0.16	0.01
	HallwayLobby	52	89%	0.84	0.19	0.21	0.05
	Kitchen/Break Room	38	69%	0.84	0.17	0.23	0.04
	Office	92	82%	0.76	0.14	0.24	0.05
	OtherMisc	16	75%	0.81	0.36	0.22	0.15
	Restrooms	13	40%	0.84	0.05	0.14	0.05
	Storage	34	52%	0.84	0.13	0.10	0.04
	All	**105**	**78%**	**0.79**	**0.16**	**0.22**	**0.05**
Other	OtherMisc	12	40%	1.65	0.18	0.14	0.02
	All	**12**	**40%**	**1.65**	**0.18**	**0.14**	**0.02**
Other Industrial	Auto Repair Workshop	7	92%	0.99	0.47	0.07	0.06
	Comm/Ind Work	83	85%	0.85	0.28	0.32	0.14
	Conference Room	16	9%	0.81	0.00	0.02	0.01
	HallwayLobby	40	83%	0.76	0.33	0.36	0.23
	Kitchen/Break Room	25	56%	1.34	0.20	0.25	0.06
	Office	66	73%	0.90	0.12	0.18	0.05
	OtherMisc	20	66%	0.94	0.10	0.38	0.09
	Restrooms	23	14%	3.27	0.15	0.15	0.08
	RetailSales	6	84%	0.95	0.35	0.30	0.22
	Storage	53	74%	0.88	0.18	0.18	0.08
	All	**133**	**75%**	**0.90**	**0.23**	**0.27**	**0.11**
Restaurant	Dining	19	79%	0.82	0.15	0.20	0.04
	Kitchen/Break Room	21	91%	0.92	0.60	0.57	0.22
	OtherMisc	13	93%	0.90	0.26	0.26	0.03
	Storage	11	79%	0.89	0.52	0.30	0.05
	All	**29**	**85%**	**0.88**	**0.33**	**0.33**	**0.10**

Building Type	Activity Area	Number of Sites	Self-Reported Adjustment		Business Hour Usage Rates		
			Self-Reported Usage	Adjustment Factor	Open Shoulder	Closed Shoulder	Closed
Retail – Large	Auto Repair Workshop	7	78%	1.04	0.50	0.39	0.02
	Comm/Ind Work	6	97%	0.94	0.49	0.49	0.29
	Conference Room	7	18%	1.41	0.05	0.09	0.02
	HallwayLobby	11	96%	0.95	0.77	0.53	0.17
	Kitchen/Break Room	12	80%	0.95	0.47	0.45	0.29
	Office	25	80%	0.96	0.38	0.43	0.14
	OtherMisc	9	93%	0.73	0.58	0.39	0.21
	Restrooms	11	74%	1.28	0.59	0.70	0.44
	RetailSales	32	97%	0.99	0.61	0.58	0.41
	Storage	35	94%	0.61	0.52	0.48	0.31
	All	**51**	**94%**	**0.82**	**0.56**	**0.51**	**0.31**
Retail – Small	Auto Repair Workshop	45	85%	0.88	0.13	0.29	0.03
	Comm/Ind Work	38	94%	0.91	0.25	0.30	0.09
	HallwayLobby	39	84%	0.95	0.15	0.19	0.05
	Kitchen/Break Room	33	81%	0.79	0.17	0.16	0.04
	Office	84	82%	0.84	0.10	0.16	0.01
	OtherMisc	23	84%	0.89	0.17	0.13	0.03
	Restrooms	19	24%	0.91	0.05	0.12	0.02
	RetailSales	104	96%	0.96	0.15	0.15	0.04
	Services	15	93%	0.91	0.27	0.33	0.09
	Storage	75	68%	1.03	0.16	0.22	0.06
	All	**208**	**88%**	**0.93**	**0.16**	**0.20**	**0.04**
Warehouse	Comm/Ind Work	14	91%	0.76	0.24	0.14	0.06
	Conference Room	12	30%	1.04	0.02	0.05	0.01
	HallwayLobby	20	70%	0.73	0.26	0.10	0.04
	Kitchen/Break Room	17	57%	0.90	0.19	0.17	0.05
	Office	44	85%	0.69	0.18	0.13	0.06
	OtherMisc	22	45%	0.76	0.05	0.08	0.02
	Restrooms	17	23%	1.52	0.13	0.13	0.04
	Storage	58	71%	0.83	0.21	0.20	0.06
	All	**87**	**73%**	**0.78**	**0.19**	**0.16**	**0.05**

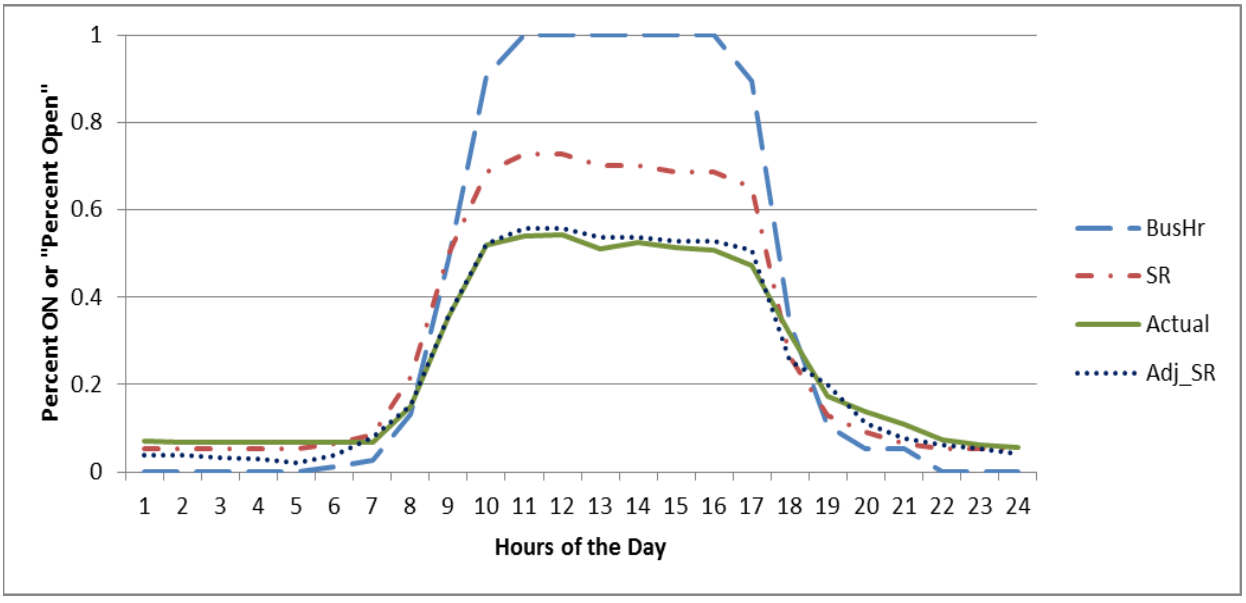
The results from the adjustment factor analysis for linear technologies yield similar results to the non-linear lighting analysis for some building types and different results for others. The similarities and differences result from both the self-reported lighting usage as well as the accuracy of the self-report. For example, the self-reported usage for non-linear and linear technologies throughout open hours were 79% and 88%, respectively. However, the adjustment factors for each technology (.96 and .93) reveal that sit contacts over-estimated usage by a similar margin.

The results from the business factor analysis for linear technologies also reveal that facilities experience measured lighting loads throughout closed hours. For some building types like retail – large and office – large, those loads are quite substantial.

Application of Results

By applying the adjustment factors to the open time period and the usage rates to the closed and shoulder time periods, 8,760 load shapes can be developed at the measure and activity area level for each building type. As mentioned above, these estimation techniques are meant to be applied to a large sample of sites and are not meant to accurately predict usage at a single site. For the adjustment factors and usage rates, since business hours can vary considerably from one site to another, they are applied to each site in the sample individually and then aggregated together. Figure 2 provides an example of this for a non-linear technology (CFL or LED) installed in an office area of an office building. An adjustment factor of .76 was multiplied by the self-reported usage during open hours (from Table 1) and business rates (from Table 1) were applied to the closed and shoulder period for each site. These individual site profiles were then aggregated together to create a population-wide estimate of usage.

FIGURE 2: POPULATION BUSINESS HOURS, SELF-REPORT, ACTUAL USAGE AND SELF-REPORT ADJUSTMENT/ USAGE RATE



Conclusion

These results will provide evaluators with two cost effective methods for obtaining accurate lighting usage estimates within nonresidential buildings. Evaluators can apply these methods by using data collected throughout the on-site verification process. These data include the facility's business hour schedule and the self-reported lighting schedule for each activity area of measure installation. Likewise, evaluators can properly weight the activity area lighting load shapes to the site level by confirming the number of measure installations (by activity area). Evaluators can then apply the adjustment factors to the self-reported usage data collected on-site and apply the usage rates to the business operating hours to develop more reliable estimates of lighting load shapes. Furthermore, since these results are developed at the technology, building type, activity area and use period level, evaluators can better understand lighting operation nuances at a much more disaggregated level than by relying simply on annual operating hour estimates.

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	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<FM050> What is the main business activity at this facility?										
Offices (non-medical)	7.46	0.04	23.58	11.69	3.69	16.17	8.61	0.00	26.45	4.11
Restaurant/Food Service	0.51	0.12	1.56	0.25	0.00	4.65	0.59	0.00	2.63	0.00
Food Store (grocery/liquor/convenience)	0.06	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.85	0.00
Agricultural (farms, greenhouses)	19.58	54.03	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00
Retail Stores	28.07	14.91	25.93	4.87	0.00	12.07	57.19	0.00	10.70	6.36
Warehouse	0.96	0.00	0.80	4.01	12.55	0.00	0.39	0.00	0.00	0.00
Health Care	0.49	0.00	0.00	0.00	0.00	8.91	0.00	0.00	11.21	10.87
Education	7.44	1.93	36.70	15.75	11.15	0.00	2.10	21.97	14.16	0.30
Lodging (hotel/rooms)	2.55	0.00	0.00	10.51	0.00	0.00	2.89	0.00	0.00	0.00
Public Assembly (church, fitness, theatre, library, museum, convention)	5.39	0.00	3.63	22.61	17.14	27.55	3.13	0.00	6.28	0.00
Services (hair, nail, massage, spa, gas, repair)	2.10	1.95	1.01	0.43	2.74	5.14	2.54	0.00	14.06	0.00
Industrial (food processing plant, manufacturing)	10.06	24.46	1.14	2.55	0.00	0.00	2.13	0.00	2.42	0.00
Laundry (Coin Operated, Commercial Laundry Facility, Dry Cleaner)	0.09	0.00	0.89	0.00	0.00	1.50	0.00	0.00	0.00	0.00
Condo Assoc./Apartment Mgr (Garden Style, Mobile Home Park, High-rise, Townhouse)	0.35	0.00	0.00	1.43	0.00	0.00	0.00	0.00	4.39	3.12
Public Service (fire/police/postal/military)	1.46	0.00	0.00	0.38	0.00	5.38	2.96	0.00	0.00	24.75
Other	13.31	2.57	4.76	23.72	52.73	18.62	17.48	78.03	6.87	50.49
REFUSED	0.12	0.00	0.00	0.79	0.00	0.00	0.00	0.00	0.00	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<FM050A> Which of the following types of offices best describes this facility?										
Administration and management	72.11	100.00	76.30	46.58	100.00	30.88	83.15	0.00	86.41	100.00
Insurance/Real Estate	10.95	0.00	16.82	0.00	0.00	0.00	16.85	0.00	0.00	0.00
Mixed-Use/Multi-tenant	7.52	0.00	6.88	20.08	0.00	0.00	0.00	0.00	13.59	0.00
Government Services	0.82	0.00	0.00	0.00	0.00	35.24	0.00	0.00	0.00	0.00
Contractor's Offices	7.81	0.00	0.00	33.34	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.79	0.00	0.00	0.00	0.00	33.88	0.00	0.00	0.00	0.00
n	*33*	*1*	*5*	*4*	*1*	*6*	*4*	*0*	*10*	*2*
<FM050B> Which of the following types of restaurants or food service best describes this facility?										
Fast Food or Self Service	37.58	0.00	0.00	0.00	0.00	100.00	67.42	0.00	14.14	0.00
Specialty/Novelty Food Service	29.25	0.00	92.83	0.00	0.00	0.00	0.00	0.00	56.48	0.00
Table Service	20.47	100.00	7.17	100.00	0.00	0.00	0.00	0.00	29.38	0.00
Other	12.70	0.00	0.00	0.00	0.00	0.00	32.58	0.00	0.00	0.00
n	*11*	*1*	*2*	*1*	*0*	*2*	*2*	*0*	*3*	*0*
<FM050C> Which of the following types of food stores best describes this facility?										
Supermarkets	67.43	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
Convenience Store	32.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
n	*2*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*1*	*0*
<FM050D> What type of agricultural facility is this?										
Commercial Greenhouse	90.22	90.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dairy/Ranch	0.40	0.00	0.00	70.33	0.00	0.00	0.00	0.00	0.00	0.00
Vineyard/Orchard	0.17	0.00	0.00	29.67	0.00	0.00	0.00	0.00	0.00	0.00
Other	9.21	9.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n	*4*	*2*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*
<FM050E> Which of the following types of retail stores best describes this facility?										
Department/Variety Store	4.46	0.00	0.98	47.47	0.00	53.82	4.21	0.00	0.00	0.00
Retail Warehouse/Club	14.78	77.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shop in Enclosed Mall	2.45	0.00	32.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shop in Strip Mall	5.13	0.00	28.91	0.00	0.00	41.92	3.77	0.00	18.35	0.00
Auto/Truck/Motorcycle Sales	50.70	0.48	33.49	0.00	0.00	0.00	69.16	0.00	34.76	0.00
Heavy Equipment Sales	0.19	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Facility is a Mall/Strip Mall	17.48	0.00	0.00	52.53	0.00	0.00	22.86	0.00	0.00	100.00
Other	4.81	21.34	4.19	0.00	0.00	4.26	0.00	0.00	46.89	0.00
n	*31*	*5*	*5*	*2*	*0*	*5*	*9*	*0*	*4*	*1*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<FM050F> Which of the following types of warehouses best describes this facility?										
Agricultural (farms, greenhouses)	12.30	0.00	0.00	0.00	73.33	0.00	0.00	0.00	0.00	0.00
Warehouse	69.56	0.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
Education	13.66	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00
Other	4.47	0.00	0.00	0.00	26.67	0.00	0.00	0.00	0.00	0.00
n	*6*	*0*	*1*	*2*	*2*	*0*	*1*	*0*	*0*	*0*
<FM050G> Which of the following types of health care centers best describes this facility?										
Medical/Dental Office	14.11	0.00	0.00	0.00	0.00	46.32	0.00	0.00	10.14	0.00
Clinic/Outpatient Care	30.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Dentist's Office	10.53	0.00	0.00	0.00	0.00	53.68	0.00	0.00	0.00	0.00
Veterinary Hospital/Clinic	16.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.82	0.00
Other	27.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.03	0.00
n	*7*	*0*	*0*	*0*	*0*	*3*	*0*	*0*	*3*	*1*
<FM050H> Which of the following types of educational centers best describes this facility?										
Daycare or Preschool	2.18	0.00	5.27	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Elementary School	22.54	49.81	13.25	36.82	0.00	0.00	9.21	0.00	0.00	0.00
Middle/Secondary School	28.84	28.16	42.59	0.00	100.00	0.00	0.00	100.00	100.00	0.00
College or University	21.50	0.00	0.00	61.77	0.00	0.00	20.35	0.00	0.00	0.00
Other	24.94	22.04	38.89	1.41	0.00	0.00	70.44	0.00	0.00	0.00
n	*28*	*4*	*8*	*8*	*1*	*0*	*4*	*1*	*1*	*1*
<FM050I> Which of the following types of lodging best describes this facility?										
Hotel	87.87	0.00	0.00	80.31	0.00	0.00	100.00	0.00	0.00	0.00
Motel	12.13	0.00	0.00	19.69	0.00	0.00	0.00	0.00	0.00	0.00
n	*13*	*0*	*0*	*11*	*0*	*0*	*2*	*0*	*0*	*0*
<FM050J> Which of the following types of public assembly buildings best describes this facility?										
Religious Assembly (worship only)	13.69	0.00	71.09	1.60	36.05	51.41	18.46	0.00	33.45	0.00
Religious Assembly (mixed use)	18.95	0.00	6.45	0.00	0.00	15.78	81.54	0.00	66.55	0.00
Health/Fitness Center/Athletic Center/Gym	32.28	0.00	0.00	47.32	63.95	0.00	0.00	0.00	0.00	0.00
Community Center/Activity Center	1.80	0.00	0.00	0.00	0.00	32.81	0.00	0.00	0.00	0.00
Other	33.28	0.00	22.46	51.08	0.00	0.00	0.00	0.00	0.00	0.00
n	*18*	*0*	*3*	*3*	*2*	*4*	*2*	*0*	*4*	*0*
<FM050K> Which of the following types of service buildings best describes this facility?										
Hair Salon	3.24	0.00	0.00	0.00	0.00	100.00	0.00	0.00	4.24	0.00
Gas Station/Auto Repair	55.46	63.08	0.00	0.00	100.00	0.00	77.76	0.00	6.67	0.00
Gas Station w/Convenience Store	3.94	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Car Wash	12.18	0.00	0.00	100.00	0.00	0.00	22.24	0.00	0.00	0.00
Other	25.17	36.92	0.00	0.00	0.00	0.00	0.00	0.00	89.09	0.00
n	*13*	*3*	*1*	*1*	*1*	*1*	*2*	*0*	*4*	*0*
<FM050L> Which of the following types of buildings best describes this facility?										
Assembly/Light Manufacturing	0.93	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Food Processing Plant	77.75	83.86	0.00	100.00	0.00	0.00	0.00	0.00	100.00	0.00
Recycling Center	3.52	0.00	0.00	0.00	0.00	0.00	48.89	0.00	0.00	0.00
Chemical/Petrochemical Production	12.36	14.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Industrial Process	3.68	0.00	0.00	0.00	0.00	0.00	51.11	0.00	0.00	0.00
Machine Shop	1.37	1.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.41	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n	*12*	*6*	*1*	*1*	*0*	*0*	*3*	*0*	*1*	*0*
<FM050M> What type of laundry facility is this?										
Coin Operated	100.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00
n	*2*	*0*	*1*	*0*	*0*	*1*	*0*	*0*	*0*	*0*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<FM050N> Which of the following types of buildings best describes this facility?										
Condominium	45.60	0.00	0.00	30.71	0.00	0.00	0.00	0.00	100.00	0.00
Apartment	54.40	0.00	0.00	69.29	0.00	0.00	0.00	0.00	0.00	100.00
n	*5*	*0*	*0*	*3*	*0*	*0*	*0*	*0*	*1*	*1*
<FM050O> Which of the following types of buildings best describes this facility?										
Police station	5.43	0.00	0.00	0.00	0.00	91.86	2.61	0.00	0.00	0.00
General Government (Municipal/State/Federal Agency Buildings)	80.99	0.00	0.00	100.00	0.00	0.00	97.39	0.00	0.00	43.65
Public Park	13.57	0.00	0.00	0.00	0.00	8.14	0.00	0.00	0.00	56.35
n	*8*	*0*	*0*	*1*	*0*	*2*	*3*	*0*	*0*	*2*
<CC2A> What is the total square footage at this facility?										
Less Than 1500 sq ft	0.79	0.00	0.00	0.16	0.00	3.28	1.55	0.00	9.36	0.00
Between 1500 and 5000 sq ft	2.08	1.11	6.25	1.47	6.69	23.09	0.96	0.00	13.42	0.00
Between 5000 and 10,000 sq ft	2.00	1.23	2.08	1.60	24.12	4.95	1.97	0.00	5.13	0.61
Between 10,000 and 25,000 sq ft	3.97	2.46	19.82	2.35	17.90	14.93	0.85	8.79	4.80	17.23
Between 25,000 and 50,000 sq ft	16.95	0.76	3.59	16.86	6.18	10.22	38.88	0.00	20.44	3.50
Between 50,000 and 75,000 sq ft	4.87	3.70	0.00	8.18	0.00	0.00	5.82	0.00	8.74	10.80
Between 75,000 and 100,000 sq ft	3.60	3.88	16.82	2.09	0.00	0.00	0.00	50.94	0.00	0.00
Over 100,000 sq ft (Ag area)	65.74	86.87	51.44	67.29	45.11	43.54	49.97	40.27	38.12	67.86
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<CC3> Would you say that the floor area is...?										
less than 1,500 sq. ft.	5.94	0.00	0.00	8.29	0.00	10.69	0.00	0.00	0.00	85.40
1,500 - 5,000 sq. ft.	12.46	5.62	4.93	28.30	0.00	21.67	2.58	0.00	16.94	0.56
5,000 - 10,000 sq. ft.	5.39	0.00	6.59	1.79	72.90	9.98	4.89	0.00	20.71	0.00
10,000 - 25,000 sq. ft.	11.09	0.72	13.46	12.24	27.10	3.36	11.12	45.44	0.00	8.25
25,000 - 50,000 sq. ft.	1.58	2.82	0.00	0.00	0.00	0.00	2.71	0.00	11.24	0.00
50,000 - 75,000 sq. ft.	2.39	0.00	0.00	2.57	0.00	0.00	4.60	0.00	0.00	0.00
75,000 - 100,000 sq. ft.	19.32	0.00	47.66	0.00	0.00	20.77	37.76	54.56	0.00	0.00
over 100,000 sq. ft. (ag area)	14.74	90.85	0.00	16.67	0.00	11.16	0.00	0.00	11.80	5.78
DON'T KNOW	27.10	0.00	27.36	30.13	0.00	22.38	36.34	0.00	39.31	0.00
n	*77*	*4*	*8*	*25*	*2*	*11*	*11*	*2*	*10*	*4*
<CC2C> Is the entire floor area of this facility heated or cooled?										
Yes	73.11	81.68	90.34	68.66	28.29	73.01	66.91	40.27	61.10	32.45
No	21.62	18.32	9.66	28.02	68.36	26.55	19.28	59.73	36.94	67.55
REFUSED	0.07	0.00	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00
DON'T KNOW	5.20	0.00	0.00	2.85	3.35	0.44	13.81	0.00	1.96	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<CC2D> What percentage of the floor area is heated or cooled at this facility?										
Less Than 15 percent	34.07	40.77	20.07	52.71	46.06	45.59	5.41	85.29	27.83	72.77
Between 15 and 30 percent	6.29	0.00	0.00	24.05	4.01	6.06	2.00	14.71	10.06	0.00
Between 30 and 45 percent	3.10	1.69	0.00	10.30	0.00	29.53	0.00	0.00	5.38	0.00
Between 45 and 60 percent	2.17	0.00	0.00	0.57	49.93	0.00	0.00	0.00	1.08	0.00
Between 60 and 80 percent	25.04	56.35	78.77	0.50	0.00	0.00	15.41	0.00	5.28	0.00
Between 80 and 100 percent	1.08	0.00	0.00	0.00	0.00	0.00	3.49	0.00	0.72	0.00
DON'T KNOW	28.26	1.19	1.16	11.87	0.00	18.83	73.69	0.00	49.65	27.23
n	*93*	*13*	*4*	*27*	*8*	*9*	*8*	*2*	*18*	*4*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<CC3A> What percentage of the floor area is heated or cooled?										
Electricity	11.96	0.00	16.91	39.64	16.06	31.30	10.60	30.76	38.15	1.87
Gas	59.49	73.23	48.83	39.58	35.66	28.07	59.13	18.30	31.98	30.41
Both electricity and gas	25.72	23.27	32.56	19.95	14.99	36.07	28.01	50.94	28.41	67.72
Propane	0.09	0.00	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00
Other	1.63	3.50	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFUSED	0.25	0.00	0.00	0.00	0.00	0.00	0.87	0.00	0.00	0.00
DON'T KNOW	0.87	0.00	0.00	0.19	33.29	4.55	1.38	0.00	1.46	0.00
n	*192*	*25*	*28*	*39*	*8*	*23*	*33*	*4*	*26*	*6*
<C0> About what percentage of your operating costs does energy account for?										
Less than 1 percent	1.62	0.33	1.18	4.96	0.00	0.51	1.44	0.00	7.65	0.00
1-2 percent	4.74	0.88	8.58	3.74	28.10	22.46	6.94	8.79	3.45	3.50
3-5 percent	5.69	4.56	7.79	10.91	18.02	25.07	2.38	18.30	13.13	0.00
6-10 percent	7.10	0.72	12.34	24.71	12.18	7.77	3.26	0.00	27.08	14.55
11-15 percent	11.80	13.64	0.11	12.50	10.96	9.31	13.08	0.00	1.68	21.67
16-20 percent	9.75	11.39	25.24	9.17	0.00	0.00	6.29	0.00	1.22	3.12
21-50 percent	17.00	0.56	8.41	13.42	3.69	5.58	40.85	0.00	6.32	0.00
Over 51 percent	4.82	0.78	13.98	3.17	9.20	2.06	6.16	0.00	2.42	46.04
DON'T KNOW	37.49	67.16	22.36	17.42	17.84	27.23	19.59	72.91	37.06	11.11
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<CC4> Does your organization own, lease, or manage the facility?										
Own	56.69	34.41	72.77	74.67	78.06	68.93	67.77	40.27	36.51	90.13
Lease/Rent	31.54	64.51	14.92	17.36	21.94	26.29	6.08	59.73	55.42	3.50
Manage	11.38	0.00	12.31	7.97	0.00	4.79	26.15	0.00	8.07	6.36
DON'T KNOW	0.39	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<C5> How many locations does your organization have. Is it....?										
This facility only	41.33	64.44	46.40	56.43	53.13	52.38	5.26	78.03	83.75	18.14
2 to 4 locations	10.75	5.88	21.27	20.57	24.76	10.90	9.44	0.00	6.40	3.12
5 to 10 locations	10.02	5.74	1.62	5.57	0.00	12.08	19.97	0.00	1.66	3.50
11 to 25 locations	22.15	4.85	21.47	4.78	0.00	10.66	51.85	0.00	1.91	13.94
more than 25 locations	15.24	19.09	9.23	11.83	22.11	13.99	12.37	21.97	6.28	61.29
DON'T KNOW	0.50	0.00	0.00	0.82	0.00	0.00	1.11	0.00	0.00	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<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...										
Very active - involved in all phases and have veto power	53.91	66.64	76.52	52.77	33.60	32.92	36.35	40.27	47.98	85.68
Somewhat active - we approve decisions and provide some input and review	39.91	25.98	22.57	37.20	16.96	43.56	61.91	50.94	37.12	9.87
Slightly active - we have a voice but it's not the dominant voice	2.70	4.14	0.91	3.64	9.44	8.43	0.00	8.79	10.52	4.45
Not active at all - we're part of a larger firm	1.19	2.98	0.00	0.00	0.00	8.36	0.00	0.00	1.33	0.00
Not active at all - our firm doesn't get involved in these issues	1.63	0.22	0.00	6.39	40.00	5.85	0.00	0.00	1.14	0.00
REFUSED	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DON'T KNOW	0.64	0.00	0.00	0.00	0.00	0.89	1.73	0.00	1.91	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<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?										
Yes	69.85	84.68	40.15	44.17	25.49	36.38	76.25	50.94	54.93	84.14
No	28.76	15.32	43.53	55.83	74.51	58.67	23.75	49.06	45.07	15.86
DON'T KNOW	1.39	0.00	16.32	0.00	0.00	4.95	0.00	0.00	0.00	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<CC8> In what year was the facility built?										
After 2010	34.70	27.10	15.90	23.80	62.16	35.13	50.46	69.24	41.20	14.32
2000s	20.89	15.69	29.58	35.32	17.90	10.01	17.63	21.97	2.69	67.71
1990s	25.95	49.59	15.75	8.03	3.69	9.34	13.63	0.00	26.77	17.37
1980s	6.77	0.78	23.38	16.00	12.87	20.64	5.24	0.00	0.94	0.00
1970s	3.60	0.55	0.11	12.40	0.00	6.79	4.04	0.00	4.12	0.61
1960s	4.74	6.04	12.70	4.19	0.00	16.51	0.38	8.79	23.20	0.00
1950	3.35	0.25	2.58	0.25	3.38	1.58	8.62	0.00	1.08	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<CC10> If you don't know, would you say it was...										
2000s	1.37	0.00	0.00	5.90	0.00	4.86	0.81	0.00	18.01	0.00
1990s	5.84	9.17	0.00	7.35	22.35	0.00	4.24	0.00	4.76	0.00
1980s	50.60	15.28	16.10	46.47	20.19	49.00	74.17	0.00	2.61	100.00
1970s	18.83	69.95	4.38	4.42	39.83	0.00	0.00	0.00	10.19	0.00
1960s	3.81	0.00	0.00	6.47	0.00	10.90	2.62	73.57	0.00	0.00
1950	0.67	0.00	8.66	3.80	0.00	5.86	0.00	0.00	1.59	0.00
Before 1950	1.60	0.80	6.88	0.00	17.63	0.00	0.00	26.43	1.20	0.00
DON'T KNOW	17.28	4.82	63.99	25.59	0.00	29.39	18.16	0.00	61.63	0.00
n	*78*	*8*	*6*	*16*	*6*	*11*	*10*	*2*	*17*	*2*
<CC11> In what year was this facility last remodeled?										
Between 2010 and present	47.49	72.92	58.80	45.77	27.54	23.00	23.44	50.94	9.28	20.89
Between 2006 and end of 2009	26.08	7.03	9.30	25.98	6.18	14.50	52.96	18.30	7.87	24.81
Between 2000 and the end of 2005	2.32	0.00	1.14	10.95	0.00	7.84	1.16	0.00	5.11	0.00
During the 1990s	3.34	0.00	0.86	1.17	3.38	4.95	8.05	0.00	12.50	0.00
REFUSED	14.54	6.87	28.45	13.53	59.56	36.17	13.28	30.76	45.97	54.30
DON'T KNOW	6.24	13.18	1.45	2.60	3.35	13.54	1.11	0.00	19.28	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<CC11A> Would you say the last remodeling was done...										
Between 2010 and present	0.76	1.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Between 2006 and end of 2009	2.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.45	0.00
Between 2000 and the end of 2005	3.22	0.00	0.00	21.90	0.00	66.77	0.00	0.00	0.00	0.00
During the 1990s	3.31	0.00	0.00	34.09	0.00	0.00	0.00	0.00	6.44	0.00
Before the 1990s	0.48	0.00	0.00	0.00	0.00	24.21	0.00	0.00	0.00	0.00
DON'T KNOW	90.22	98.82	100.00	44.01	100.00	9.02	100.00	0.00	58.11	0.00
n	*24*	*5*	*1*	*5*	*1*	*4*	*3*	*0*	*5*	*0*
<CC11AB> When you remodeled, did you change out your building systems?										
Yes	39.49	63.07	69.65	41.10	31.11	18.35	8.83	0.00	23.16	47.42
No	52.26	24.12	30.35	54.21	68.89	75.11	86.03	100.00	23.81	52.58
DON'T KNOW	8.25	12.81	0.00	4.70	0.00	6.54	5.15	0.00	53.03	0.00
n	*177*	*21*	*19*	*49*	*7*	*18*	*31*	*2*	*24*	*6*
<CC12A> In what year was this organization established at this location?										
Between 2010 and present	40.79	53.17	22.82	16.21	6.09	11.31	49.25	8.79	13.44	4.45
Between 2006 and end of 2009	2.09	0.13	0.00	1.77	11.90	5.48	3.79	0.00	12.94	0.00
Between 2000 and the end of 2005	8.12	8.09	9.07	15.47	24.76	9.15	4.16	0.00	15.13	0.00
During the 1990s	19.82	15.80	28.64	23.40	22.11	21.28	18.55	21.97	5.29	82.26
During the 1980s	3.68	0.42	7.05	3.56	3.69	0.00	5.42	0.00	20.39	6.93
During the 1970s	4.75	0.00	15.84	20.48	6.69	18.44	0.00	0.00	5.12	0.00
During the 1960s	1.75	0.85	2.58	0.16	15.56	4.35	2.80	0.00	0.40	0.00
During the 1950s	3.74	5.00	12.70	4.05	0.00	9.75	0.55	0.00	0.00	0.00
Before the 1950s	4.51	1.19	0.00	8.03	0.00	0.13	8.43	0.00	1.08	0.00
DON'T KNOW	10.75	15.34	1.31	6.88	9.20	20.11	7.05	69.24	26.22	6.36
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<CC12B> Would you say it was...										
Between 2010 and present	0.04	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00
Between 2006 and end of 2009	3.77	0.00	0.00	26.16	0.00	0.00	0.00	0.00	23.95	0.00
Between 2000 and the end of 2005	6.33	7.15	0.00	10.34	100.00	28.33	0.00	0.00	0.00	0.00
During the 1990s	1.65	2.77	22.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00
During the 1980s	45.73	88.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
During the 1970s	4.48	0.00	0.00	9.46	0.00	69.11	9.80	0.00	0.00	0.00
During the 1960s	6.39	0.00	0.00	19.44	0.00	0.00	8.19	26.43	18.61	0.00
During the 1950s	30.42	1.19	0.00	30.44	0.00	2.56	82.01	73.57	56.12	100.00
Before the 1950s	1.19	0.00	77.37	3.69	0.00	0.00	0.00	0.00	1.32	0.00
n	*35*	*4*	*2*	*11*	*1*	*4*	*4*	*2*	*6*	*1*
<BC090> Has the square footage of the facility increased, decreased or remained the same since January 2016?										
Increase in square footage	2.27	0.00	0.00	7.09	0.00	0.00	2.74	21.97	2.42	0.00
Stayed the same	93.59	88.49	100.00	92.91	100.00	100.00	97.26	78.03	97.58	100.00
DON'T KNOW	4.15	11.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<BC100> How many square feet were added?										
1300	2.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
3200	9.85	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00
20000	2.89	0.00	0.00	0.00	0.00	0.00	7.04	0.00	0.00	0.00
33000	38.19	0.00	0.00	0.00	0.00	0.00	92.96	0.00	0.00	0.00
40100	26.45	0.00	0.00	56.56	0.00	0.00	0.00	0.00	0.00	0.00
50000	20.32	0.00	0.00	43.44	0.00	0.00	0.00	0.00	0.00	0.00
n	*6*	*0*	*0*	*2*	*0*	*0*	*2*	*1*	*1*	*0*
<BC120> In what year did this <BC090> occur?										
2016	30.17	0.00	0.00	43.44	0.00	0.00	0.00	100.00	0.00	0.00
2017	66.94	0.00	0.00	56.56	0.00	0.00	92.96	0.00	100.00	0.00
REFUSED	2.89	0.00	0.00	0.00	0.00	0.00	7.04	0.00	0.00	0.00
n	*6*	*0*	*0*	*2*	*0*	*0*	*2*	*1*	*1*	*0*
<V1> Did you use a contractor/vendor to install any of the the energy efficient measures that were purchased through the program?										
Yes	93.67	98.04	99.75	80.43	66.71	57.22	97.76	78.03	62.97	99.70
No	5.36	1.96	0.25	14.99	22.33	41.41	1.91	21.97	36.48	0.30
DON'T KNOW	0.97	0.00	0.00	4.59	10.96	1.37	0.33	0.00	0.56	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<V2> How did you come into contact with the contractor/vendor?										
They contacted you	19.22	6.91	16.17	31.90	74.02	46.27	24.12	0.00	56.39	52.82
You contacted them	14.94	13.22	21.17	23.92	0.00	15.80	12.75	0.00	17.36	11.44
You had worked with them before	54.56	77.30	34.80	27.64	0.00	9.75	51.85	0.00	23.68	4.46
Other	10.04	1.82	26.99	16.54	25.98	9.96	11.28	34.71	2.58	17.28
DON'T KNOW	1.24	0.76	0.86	0.00	0.00	18.22	0.00	65.29	0.00	13.99
n	*185*	*24*	*29*	*43*	*7*	*14*	*34*	*3*	*22*	*9*
<V2A> In relation to this project, did the vendor/contractor approach you about your energy efficient equipment retrofit/installation?										
Yes	76.59	91.07	17.25	22.11	0.00	92.15	74.82	0.00	41.36	0.00
No	21.35	8.93	82.75	77.89	0.00	7.85	20.15	0.00	0.00	100.00
DON'T KNOW	2.06	0.00	0.00	0.00	0.00	0.00	5.03	0.00	58.64	0.00
n	*50*	*9*	*9*	*15*	*0*	*2*	*11*	*0*	*3*	*1*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<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?										
0 NOT AT ALL LIKELY	5.49	0.55	65.35	10.29	0.00	62.66	0.81	0.00	29.86	93.35
1	1.54	0.00	0.00	3.46	50.13	10.31	0.94	0.00	19.63	0.00
2	0.59	0.00	0.00	0.00	6.78	0.00	1.19	0.00	0.00	6.65
3	1.94	0.00	0.00	0.00	0.00	0.00	4.83	0.00	11.03	0.00
4	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.00
5	13.59	0.00	3.60	50.99	12.15	15.14	24.72	0.00	9.45	0.00
6	0.80	0.00	0.00	9.09	0.00	11.90	0.00	0.00	0.00	0.00
7	1.35	0.00	0.00	0.00	6.84	0.00	3.50	0.00	0.00	0.00
8	10.03	18.19	8.08	3.21	0.00	0.00	2.27	0.00	0.00	0.00
9	3.15	6.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 VERY LIKELY	61.11	74.66	22.97	22.95	0.00	0.00	61.42	0.00	28.73	0.00
DON'T KNOW	0.38	0.00	0.00	0.00	24.10	0.00	0.31	0.00	0.00	0.00
n	*86*	*10*	*13*	*17*	*5*	*9*	*14*	*0*	*15*	*3*
<V3> Did the contractor/vendor tell you about or recommend the program?										
Yes	73.43	74.37	47.11	55.66	74.02	65.21	86.87	76.55	48.11	63.73
No	23.80	25.63	52.89	42.38	25.98	26.14	7.50	23.45	34.10	22.29
DON'T KNOW	2.77	0.00	0.00	1.97	0.00	8.64	5.63	0.00	17.79	13.99
n	*185*	*24*	*29*	*43*	*7*	*14*	*34*	*3*	*22*	*9*
<V4> Prior to coming into contact with the contractor/vendor, did your organization have plans to replace/install this equipment?										
Yes	56.44	98.80	51.66	54.64	43.09	26.34	22.69	14.71	3.38	22.62
No	43.20	1.20	48.34	45.36	56.91	73.66	76.45	85.29	96.62	77.38
DON'T KNOW	0.36	0.00	0.00	0.00	0.00	0.00	0.86	0.00	0.00	0.00
n	*107*	*9*	*17*	*21*	*5*	*10*	*24*	*2*	*15*	*4*
<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?										
0 NOT AT ALL LIKELY	6.25	0.46	28.28	6.88	50.13	53.09	2.50	85.29	27.42	77.38
1	2.15	0.00	15.95	10.33	0.00	0.00	0.00	0.00	27.00	0.00
2	8.65	4.73	2.28	0.00	6.78	0.00	15.40	0.00	13.79	5.52
3	5.05	0.00	1.70	34.35	6.84	15.27	3.50	0.00	0.00	0.00
4	0.18	0.00	1.83	0.57	0.00	0.00	0.00	0.00	1.78	0.00
5	5.27	1.27	0.00	0.00	0.00	21.56	10.80	0.00	13.77	0.00
6	4.74	0.00	2.16	0.00	12.15	10.08	10.09	0.00	0.00	17.11
7	5.82	6.86	3.10	29.91	0.00	0.00	0.23	0.00	2.51	0.00
8	8.44	18.70	9.98	1.29	0.00	0.00	1.24	0.00	9.36	0.00
9	0.13	0.00	0.00	0.00	0.00	0.00	0.00	14.71	0.00	0.00
10 VERY LIKELY	53.29	67.97	34.73	16.67	24.10	0.00	56.24	0.00	0.00	0.00
DON'T KNOW	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.38	0.00
n	*107*	*9*	*17*	*21*	*5*	*10*	*24*	*2*	*15*	*4*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<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?										
0 NOT AT ALL LIKELY	6.48	0.16	63.17	5.17	50.13	53.09	1.27	0.00	9.68	77.38
1	2.72	0.00	17.64	11.14	6.78	8.73	0.50	0.00	27.00	5.52
2	8.38	4.73	0.00	1.29	0.00	0.00	15.40	0.00	0.00	0.00
3	7.28	0.00	0.00	26.98	0.00	0.00	10.31	0.00	35.90	0.00
4	0.20	0.00	1.83	0.00	0.00	10.08	0.00	0.00	4.29	0.00
5	8.79	0.20	2.12	12.69	6.84	28.10	16.72	0.00	13.77	0.00
6	1.98	0.00	2.16	0.00	12.15	0.00	4.18	0.00	0.00	0.00
7	10.32	19.77	2.60	24.67	0.00	0.00	0.00	0.00	0.00	17.11
8	29.60	74.09	10.24	0.23	0.00	0.00	1.47	0.00	9.36	0.00
9	0.64	0.00	0.00	0.00	0.00	0.00	1.23	14.71	0.00	0.00
10 VERY LIKELY	21.96	0.74	0.00	15.63	0.00	0.00	48.14	0.00	0.00	0.00
REFUSED	0.22	0.00	0.00	0.00	24.10	0.00	0.00	0.00	0.00	0.00
DON'T KNOW	1.43	0.30	0.24	2.21	0.00	0.00	0.79	85.29	0.00	0.00
n	*107*	*9*	*17*	*21*	*5*	*10*	*24*	*2*	*15*	*4*
<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?										
0 Not at all important	1.40	0.00	0.00	12.26	6.78	24.94	0.00	0.00	0.00	0.00
2	0.41	1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.38	0.00
5	0.92	0.00	2.16	0.57	0.00	28.10	0.86	0.00	0.00	17.11
6	1.23	0.00	1.83	0.50	50.13	0.00	1.47	0.00	0.00	0.00
7	5.05	4.73	0.74	0.00	6.84	1.75	5.16	0.00	4.36	72.47
8	30.33	67.23	5.34	34.93	12.15	10.08	1.47	0.00	9.90	5.52
9	12.43	18.70	5.26	16.78	0.00	0.00	6.38	14.71	58.89	0.00
10 VERY IMPORTANT	45.33	8.27	84.67	34.96	24.10	35.14	77.85	85.29	21.08	4.91
DON'T KNOW	2.89	0.00	0.00	0.00	0.00	0.00	6.81	0.00	4.38	0.00
n	*107*	*9*	*17*	*21*	*5*	*10*	*24*	*2*	*15*	*4*
<AP9> How did you FIRST learn about <UTILITY>'s program?										
Bill insert	18.81	0.00	46.55	42.22	61.92	41.05	0.00	0.00	68.80	0.00
Program literature	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.70	0.00
Account representative	60.42	92.00	0.00	3.69	0.00	0.00	21.71	100.00	0.00	0.00
Program approved vendor	8.13	10.10	0.00	0.00	0.00	0.00	12.43	0.00	0.00	0.00
Program representative	3.62	0.00	0.00	0.00	74.81	43.79	0.00	0.00	0.00	0.00
Utility or program website	78.77	96.81	70.76	0.00	0.00	2.05	23.68	0.00	52.80	0.00
Trade publication	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Conference	19.17	64.75	0.00	0.00	0.00	0.00	4.53	0.00	0.00	0.00
Newspaper article	1.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.03	0.00
Word of mouth	14.39	32.45	0.00	21.73	42.64	59.18	0.00	100.00	26.09	0.00
Previous experience with it	14.46	0.00	90.47	0.00	0.00	0.00	0.00	0.00	0.00	40.42
Company used it at other locations	34.89	0.00	0.00	0.00	0.00	0.00	48.95	0.00	0.00	0.00
Contractor	75.86	0.00	89.77	68.67	47.56	0.00	80.76	0.00	0.00	79.02
Result of an audit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Part of a larger expansion or remodeling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
No other sources	87.97	94.10	98.79	88.77	95.20	90.91	75.78	100.00	93.28	30.31
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFUSED	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
,DON'T KNOW	38.62	4.22	52.55	3.19	0.00	60.87	48.22	0.00	74.91	0.00
n	*38*	*4*	*2*	*9*	*2*	*5*	*7*	*0*	*6*	*3*
<A3A> According to our records, your organization installed <LT_QTY_n> <LT_MEAS_n> through <UTILITY>'s program, is this correct?										
Yes - Quantity is Correct	95.32	91.00	100.00	99.19	100.00	95.65	98.87	59.73	94.85	96.88
Installed Different Quantity	4.69	9.00	0.00	0.81	0.00	4.35	1.13	40.27	5.15	3.12
n	*229*	*30*	*4*	*60*	*12*	*30*	*39*	*4*	*40*	*10*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<A3AA> According to our records, your organization installed <LT_MEAS_n> through <UTILITY>'s program, is this correct?										
Yes	100.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n	*26*	*0*	*26*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
<A3A_OTH> Would you say that the number of <LT_MEAS_n> installed are...										
less than 10 units	14.77	0.00	15.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11 - 50 units	1.48	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
50 - 100 units	7.44	0.00	7.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
More than 100 units	74.44	100.00	74.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DON'T KNOW	1.87	0.00	1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n	*10*	*2*	*7*	*1*	*0*	*0*	*0*	*0*	*0*	*0*
<Deem_install_date1_nu> Our records indicate that your organization installed <LT_MEAS_n> on <DEEM_INSTALL_DATEn>. Is this correct?										
Yes	98.76	98.24	100.00	95.99	100.00	100.00	100.00	100.00	99.60	99.70
No	1.24	1.76	0.00	4.01	0.00	0.00	0.00	0.00	0.40	0.00
DON'T KNOW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<Deem_install_year1> In what year did you install <LT_MEAS_n>?										
2016	39.45	76.24	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
2017	57.22	17.22	0.00	100.00	0.00	0.00	0.00	0.00	0.00	100.00
DON'T KNOW	3.33	6.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n	*7*	*4*	*0*	*1*	*0*	*0*	*0*	*0*	*1*	*1*
<Deem_install_month1> And what month?										
January	49.79	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
April	9.77	18.42	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
July	31.10	63.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fall	9.00	18.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DON'T KNOW	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
n	*6*	*3*	*0*	*1*	*0*	*0*	*0*	*0*	*1*	*1*
<LIA19A> Where did you install the LED fixtures/lamps that you received through the program?										
Parking lots	86.96	0.00	0.00	65.74	0.00	0.00	97.63	0.00	0.00	39.83
Garages	32.11	0.00	0.00	13.25	0.00	0.00	65.99	0.00	0.00	5.85
Walkways	78.13	0.00	0.00	50.69	0.00	0.00	93.27	0.00	0.00	45.48
Patios/Outdoor seating areas	66.36	0.00	0.00	24.75	0.00	0.00	90.50	0.00	0.00	6.29
Outside door	74.80	0.00	0.00	54.87	0.00	0.00	90.04	0.00	0.00	19.57
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFUSED	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DON'T KNOW	2.98	0.00	0.00	0.00	0.00	0.00	15.11	0.00	0.00	0.00
n	*96*	*0*	*0*	*51*	*0*	*0*	*36*	*0*	*0*	*9*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<LI191A> Where did you install the LED fixtures/lamps that you received through the program?										
Open office	38.84	23.39	85.54	0.00	24.40	64.14	0.00	79.94	93.37	0.00
Private office	32.05	18.22	65.29	0.00	63.73	60.15	0.00	79.94	87.62	0.00
Hallway	26.22	10.84	69.48	0.00	50.16	39.05	0.00	0.00	95.51	0.00
Lobby	31.34	19.75	69.16	0.00	24.40	47.85	0.00	0.00	86.26	0.00
Stairwell	17.67	7.48	56.10	0.00	0.00	24.99	0.00	0.00	80.18	0.00
Kitchen/Break area	24.95	15.88	57.76	0.00	27.23	40.64	0.00	0.00	85.99	0.00
Restrooms	23.18	13.00	62.33	0.00	0.00	43.71	0.00	0.00	85.54	0.00
Dining	12.64	7.97	43.00	0.00	0.00	13.45	0.00	0.00	58.28	0.00
Retail space	16.69	9.69	46.66	0.00	0.00	46.64	0.00	0.00	63.65	0.00
Conference room	21.91	16.37	51.48	0.00	0.00	16.98	0.00	0.00	71.10	0.00
Warehouse	30.81	28.10	39.87	0.00	61.88	28.54	0.00	59.73	54.22	0.00
Storage	16.08	8.91	48.19	0.00	27.23	26.33	0.00	0.00	79.41	0.00
Outdoor	18.71	10.77	54.84	0.00	0.00	23.58	0.00	0.00	72.46	0.00
Guest rooms	2.41	0.00	21.43	0.00	0.00	2.53	0.00	0.00	5.59	0.00
Gynasium	9.14	2.55	51.24	0.00	53.50	0.00	0.00	0.00	32.48	0.00
Other	100.00	100.00	100.00	0.00	100.00	100.00	0.00	100.00	100.00	0.00
REFUSED	0.31	0.00	3.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DON'T KNOW	0.03	0.00	0.00	0.00	0.00	2.59	0.00	0.00	0.00	0.00
n	*93*	*19*	*20*	*0*	*3*	*18*	*0*	*3*	*30*	*0*
<LI192A> Where did you install the LED downlighting that you received through the program?										
Open office	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Private office	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hallway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lobby	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stairwell	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kitchen/Break area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Restrooms	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dining	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Retail space	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Conference room	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Warehouse	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Storage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Outdoor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Guest rooms	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gynasium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFUSED	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DON'T KNOW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<LI20A> What type of lighting was removed and replaced when you installed <LT_MEAS_n> through the program?										
High performance T8 (1' diameter bulbs)	5.05	0.78	1.07	0.00	0.00	0.00	13.81	0.00	0.00	0.00
T8 fluorescent fixtures (1' diameter bulbs)	10.03	13.32	29.11	1.02	10.07	50.64	3.06	21.97	35.28	0.00
T10 fluorescent fixtures	3.35	5.00	6.11	0.64	0.00	10.10	0.73	8.79	23.33	0.00
T12 Fixtures (1.5' diameter bulbs)	4.03	0.43	41.43	0.00	0.00	15.49	0.00	0.00	14.95	0.00
Compact HID (High Density Discharge) Fixtures LI21	7.46	14.33	0.00	4.22	10.96	0.00	4.50	0.00	0.00	0.00
Screw-in Modular CFLs	0.09	0.00	0.00	0.44	0.00	0.00	0.00	0.00	1.08	0.00
Hardwire CFL Fixtures	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Incandescent	2.80	0.91	0.00	9.95	6.18	0.00	1.13	18.30	5.84	14.98
CFL Exit Signs	0.39	0.00	2.58	0.77	0.00	0.00	0.19	0.00	0.00	0.00
LED Exit Signs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Halogen bulbs	5.31	2.14	11.27	17.40	0.00	5.43	2.01	0.00	3.98	13.94
Reflectors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electronic Ballast	0.38	0.00	0.00	2.56	0.00	0.00	0.00	0.00	0.00	0.00
Magnetic Ballast	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manual Switches	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lighting Controls, Time Clock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lighting Controls, Occupancy Sensor	2.28	6.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lighting Controls, Bypass/Delay Timers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lighting Controls, Photocell	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Fluorescent	4.20	6.32	2.28	6.91	39.96	14.03	0.00	0.00	1.80	0.00
Fat/Thick Tubes	0.07	0.00	0.00	0.00	0.00	6.59	0.00	0.00	0.00	0.00
Skinny/Thin Tubes	0.06	0.00	0.00	0.00	0.00	0.71	0.00	0.00	2.42	0.00
T5 Fixtures (5/8' diameter)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Screw-in LEDs	0.30	0.13	0.00	0.00	0.00	0.00	0.73	0.00	0.00	0.00
Screw-in LEDs Reflector Lamps	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.99	0.00
LED Fixtures or Panels (e.g., replacement for linear fixtures)	0.28	0.00	0.00	1.60	0.00	0.47	0.00	0.00	1.66	0.00
DID NOT REMOVE ANYTHING-ADDITIONAL EQUIP ONLY	18.04	49.02	0.00	2.55	0.00	0.00	0.00	0.00	0.00	0.00
Other	34.64	12.92	17.06	38.58	20.93	6.79	62.47	0.00	18.64	64.41
REFUSED	0.08	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.00	0.00
DON"T KNOW	10.66	1.12	10.96	21.01	11.90	6.84	14.70	50.94	18.22	6.67
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<LI21A> Were the HID lamps you removed High Pressure Sodium, Metal Halide, Mercury Vapor or Incandescent?										
High pressure sodium	15.74	0.00	0.00	0.00	100.00	0.00	67.75	0.00	0.00	0.00
Metal Halide	84.26	100.00	0.00	100.00	0.00	0.00	32.25	0.00	0.00	0.00
n	*10*	*3*	*0*	*3*	*1*	*0*	*3*	*0*	*0*	*0*
<LI22A> Approximately how old was the equipment that were removed and replaced? Would you say...										
Less than 5 years old	8.00	0.00	7.50	12.31	0.00	14.99	9.47	0.00	35.61	0.30
Between 5 and 10 years old	16.40	20.73	17.11	8.14	21.97	37.20	14.29	40.27	14.69	57.46
Between 10 and 15 years old	17.98	48.86	20.69	15.34	20.35	0.00	2.96	8.79	17.99	6.62
More than 15 years old	50.63	29.62	54.34	58.87	57.68	42.35	59.48	50.94	30.22	35.62
DON'T KNOW	6.99	0.79	0.36	5.34	0.00	5.46	13.81	0.00	1.49	0.00
n	*253*	*29*	*30*	*59*	*12*	*30*	*39*	*4*	*40*	*10*
<LI23A> How would you describe the removed equipment's condition? Would you say they were in...										
Poor condition	38.02	37.12	4.36	21.13	0.00	6.43	58.34	72.91	11.62	4.45
Fair condition	43.34	45.99	71.45	44.51	68.20	52.45	31.56	27.09	57.62	77.48
Good condition	15.24	10.10	24.19	33.61	31.80	40.61	5.89	0.00	30.76	18.07
DON'T KNOW	3.41	6.79	0.00	0.75	0.00	0.51	4.22	0.00	0.00	0.00
n	*253*	*29*	*30*	*59*	*12*	*30*	*39*	*4*	*40*	*10*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<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?										
5 - 10	50.94	0.20	3.62	100.00	0.00	22.11	100.00	0.00	3.63	100.00
10 - 20	36.07	70.05	91.59	0.00	55.13	71.28	0.00	21.97	75.84	0.00
20 - 30	8.54	20.05	1.52	0.00	12.61	4.20	0.00	78.03	8.74	0.00
30 - 40	2.67	7.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40 - 50	0.52	1.04	0.00	0.00	11.15	0.00	0.00	0.00	0.00	0.00
Over 50	1.27	1.24	3.27	0.00	21.10	2.41	0.00	0.00	11.79	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<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.										
Yes	17.45	81.34	0.71	0.00	46.02	4.05	0.00	100.00	8.22	0.00
No	56.72	18.66	56.39	0.00	53.98	95.95	0.00	0.00	69.66	0.00
DON'T KNOW	25.83	0.00	42.90	0.00	0.00	0.00	0.00	0.00	22.12	0.00
n	*75*	*7*	*16*	*0*	*3*	*21*	*0*	*1*	*27*	*0*
<HB3> What is the main kind of LED Fixture located at this height?										
Linear LED (T-LED)	3.36	0.80	15.41	0.00	4.90	30.92	0.00	0.00	24.76	0.00
Integrated LED Troffers	2.41	2.15	1.52	0.00	0.00	0.00	0.00	21.97	0.00	0.00
Round LED High Bay (similar shape to an HID fixture)	64.23	75.14	7.15	0.00	47.29	4.01	0.00	50.94	8.83	0.00
Panel LED	3.43	0.00	29.23	0.00	8.21	8.70	0.00	0.00	0.00	0.00
Other	4.44	1.10	27.36	0.00	14.82	25.17	0.00	0.00	0.00	0.00
DON'T KNOW	22.13	20.82	19.33	0.00	24.77	31.20	0.00	27.09	66.41	0.00
n	*86*	*28*	*15*	*0*	*11*	*12*	*0*	*4*	*16*	*0*
<DEL5> Is the amount of lighting better, worse, or the same than before your LED retrofit?										
Better	96.05	99.88	99.14	79.30	100.00	70.09	99.09	100.00	95.57	99.09
Same	3.37	0.12	0.86	17.37	0.00	29.91	0.91	0.00	0.77	0.91
REFUSED	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.00
DON'T KNOW	0.57	0.00	0.00	3.34	0.00	0.00	0.00	0.00	3.24	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<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?										
To replace old or outdated equipment	3.64	0.78	1.49	17.14	31.79	3.97	0.55	0.00	1.62	0.00
As part of a planned remodeling, build-out, or expansion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
To gain more control over how the equipment was used	0.79	0.00	0.00	0.00	0.00	0.00	2.33	0.00	0.00	0.00
Maintenance downtime/associated expenses for old equipment were too high	0.80	0.72	1.68	0.22	11.15	5.14	0.50	0.00	0.00	0.00
Had process problems and were seeking a solution	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
To improve equipment performance	12.09	1.14	12.12	39.00	21.90	20.93	11.73	8.79	12.38	0.91
To improve production as a result of the change in equipment	0.47	0.22	0.00	0.00	0.00	0.00	1.15	0.00	0.00	0.00
To comply with codes set by regulatory agencies	0.48	0.30	0.00	1.16	0.00	0.00	0.58	0.00	0.00	0.00
To improve visibility/plant safety	6.60	2.26	5.77	18.80	0.00	1.61	6.74	0.00	8.60	0.61
To comply with company policies regarding regular equipment retrofits or remodeling	0.14	0.00	0.82	0.49	0.00	0.00	0.00	0.00	0.00	0.00
To get a rebate from the program	39.17	82.42	14.53	20.28	13.73	6.93	13.16	0.00	22.95	3.12
To protect the environment	4.27	0.15	3.56	5.74	0.00	5.21	8.05	0.00	13.17	0.00
To reduce energy costs	62.65	34.43	74.51	60.06	46.31	87.69	87.49	91.21	78.30	96.58
To reduce energy use/power outages	15.19	4.23	12.17	25.27	26.47	33.99	20.78	59.73	10.58	21.67
To update to the latest technology	3.58	1.00	21.10	8.50	0.00	4.79	0.38	0.00	1.71	0.00
To improve the comfort level of the facility	3.96	0.18	8.02	3.42	0.00	0.00	7.39	21.97	0.00	0.00
Other	0.20	0.00	0.00	0.00	0.00	0.89	0.00	0.00	1.68	10.87
REFUSED	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DON'T KNOW	0.42	0.00	2.58	0.96	0.00	5.60	0.00	0.00	0.16	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*

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<AA3A> Had the equipment that you replaced reached the end of its useful life?										
Yes	85.99	71.72	89.83	98.44	77.87	38.79	47.51	0.00	25.87	0.00
No	14.01	28.28	10.17	1.56	22.13	61.21	52.50	0.00	74.13	0.00
n	*21*	*2*	*4*	*6*	*3*	*2*	*2*	*0*	*2*	*0*
<N2> Did your organization make the decision to install this new equipment before or, after, or at the same time as you became aware of that rebates were available through the PROGRAM?										
Before	32.45	59.04	29.41	23.44	0.00	6.32	14.28	0.00	13.60	4.45
After	18.97	19.22	36.17	24.05	10.96	29.79	10.77	49.06	18.65	34.23
Same time	46.72	20.72	34.42	48.76	89.04	46.92	73.30	50.94	58.96	61.32
DON'T KNOW	1.86	1.02	0.00	3.75	0.00	16.96	1.65	0.00	8.78	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<N3A> How would you rate the importance of the age or condition of the old equipment?										
0 Not at all important	21.60	49.78	21.39	4.90	9.87	15.11	0.56	0.00	2.81	46.04
1	3.41	0.00	0.00	3.57	0.00	4.95	8.05	0.00	4.39	0.00
2	1.87	3.45	0.00	0.00	0.00	12.59	1.44	0.00	0.00	0.00
3	3.36	7.98	0.00	0.88	0.00	6.49	0.63	0.00	3.00	0.00
4	1.40	1.10	9.60	1.09	0.00	0.00	0.00	0.00	2.11	0.61
5	9.18	0.12	36.07	7.00	6.12	10.84	11.54	0.00	43.80	6.36
6	3.54	0.85	1.66	14.35	0.00	14.52	1.97	0.00	5.58	0.00
7	3.33	1.30	6.62	4.53	10.04	3.07	2.98	0.00	10.62	17.37
8	17.91	27.68	1.14	35.14	35.72	20.36	2.70	30.76	15.34	25.18
9	4.99	0.37	0.00	2.19	0.00	5.70	13.08	0.00	1.66	0.00
10 Extremely important	26.03	7.37	23.52	23.80	38.25	5.48	48.32	69.24	8.78	4.45
DON'T KNOW	3.39	0.00	0.00	2.55	0.00	0.89	8.72	0.00	1.91	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<N3B> How would you rate the importance of the availability of the PROGRAM rebate?										
0 Not at all important	0.59	0.54	0.30	0.80	0.00	0.00	0.00	0.00	11.60	0.00
2	2.27	2.98	0.00	8.03	0.00	0.00	0.00	0.00	0.00	0.00
3	0.72	0.25	0.00	4.13	0.00	0.00	0.00	0.00	0.42	0.00
4	0.19	0.00	1.14	0.65	0.00	0.00	0.00	0.00	0.00	0.00
5	3.91	0.85	16.71	4.70	8.74	4.95	1.71	0.00	32.46	6.36
6	1.12	0.00	1.01	6.12	0.00	0.00	0.08	0.00	4.63	0.00
7	3.17	2.00	16.29	0.54	0.00	1.28	2.75	0.00	4.09	0.00
8	9.09	7.39	0.11	16.86	0.00	15.22	7.90	0.00	18.79	46.95
9	8.71	18.71	6.85	2.81	9.55	5.27	0.55	8.79	8.85	24.81
10 Extremely important	68.82	67.10	57.59	50.30	81.70	49.93	86.34	91.21	14.38	21.87
REFUSED	0.02	0.00	0.00	0.00	0.00	1.93	0.00	0.00	0.00	0.00
DON'T KNOW	1.39	0.18	0.00	5.07	0.00	21.42	0.67	0.00	4.77	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<N3D> How would you rate the importance of the recommendation from an equipment vendor that sold you the equipment and/or installed it for you?										
0 Not at all important	1.77	0.83	0.00	2.24	14.28	0.00	2.38	23.45	0.00	0.00
1	4.43	11.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1.00	0.31	0.30	0.00	0.00	9.58	2.22	0.00	0.63	0.00
3	0.37	0.00	3.96	0.00	0.00	0.00	0.08	0.00	0.00	0.00
4	0.55	0.19	1.14	2.92	0.00	0.00	0.00	0.00	0.00	0.00
5	6.09	5.16	15.97	3.25	0.00	0.77	2.68	0.00	16.16	77.45
6	1.92	0.00	0.00	13.30	0.00	0.00	0.41	0.00	0.00	4.46
7	3.26	0.34	1.69	1.99	14.06	16.53	6.29	0.00	17.79	0.61
8	11.76	9.17	14.20	42.49	0.00	26.69	3.11	11.26	12.85	3.52
9	9.81	20.35	9.14	1.35	0.00	0.00	2.66	0.00	15.23	0.00
10 Extremely important	56.89	51.90	53.60	25.81	53.83	45.30	77.56	65.29	34.30	3.13
REFUSED	0.92	0.00	0.00	0.00	0.00	0.00	2.61	0.00	0.00	0.00
DON'T KNOW	1.23	0.00	0.00	6.65	17.84	1.14	0.00	0.00	3.03	10.84
n	*185*	*24*	*29*	*43*	*7*	*14*	*34*	*3*	*22*	*9*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<N3E> How would you rate the importance of your previous experience with similar types of energy efficient projects?										
0 Not at all important	4.31	0.97	26.35	2.83	6.18	12.40	0.88	18.30	2.07	46.04
1	1.99	0.13	0.30	11.55	0.00	0.00	0.00	0.00	0.00	13.94
2	0.50	0.38	0.00	0.00	0.00	0.51	1.05	0.00	0.00	0.00
3	0.70	1.04	3.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.63	0.38	0.00	3.13	0.00	0.00	0.00	0.00	1.32	0.00
5	8.97	4.32	0.00	12.63	3.38	19.77	13.47	8.79	27.92	0.00
6	0.49	0.00	2.80	0.00	0.00	0.00	0.08	0.00	0.76	15.32
7	7.51	13.79	4.54	4.51	0.00	10.78	3.16	0.00	14.19	0.00
8	33.65	70.93	18.45	17.64	10.96	15.97	8.33	21.97	19.76	11.41
9	3.75	6.73	0.00	1.22	0.00	0.00	3.15	0.00	1.01	3.50
10 Extremely important	26.56	0.04	27.48	21.40	0.00	5.44	61.55	0.00	5.39	3.12
REFUSED	0.51	0.00	0.00	2.35	0.00	5.14	0.00	0.00	0.60	6.36
DON'T KNOW	10.45	1.28	16.13	22.74	79.48	29.99	8.33	50.94	26.98	0.30
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<N3F> How would you rate the importance of your previous experience with the UTILITY's program or a similar utility program?										
0 Not at all important	4.61	0.39	27.87	4.85	6.18	11.93	0.55	18.30	11.07	46.04
1	2.15	0.00	0.00	13.64	0.00	0.00	0.33	0.00	0.00	0.00
2	0.83	0.69	0.00	2.89	0.00	7.84	0.19	0.00	0.00	0.00
3	0.03	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	2.79	6.43	0.00	2.98	0.00	0.00	0.08	0.00	0.00	0.00
5	4.66	6.40	16.23	1.47	3.38	6.98	1.45	0.00	0.00	13.94
6	20.02	50.49	1.66	9.73	0.00	0.00	0.00	0.00	1.32	15.32
7	6.20	13.64	0.89	5.59	0.00	17.72	0.00	0.00	8.70	0.00
8	12.52	13.59	11.05	17.07	0.00	11.18	10.28	0.00	14.47	17.77
9	2.43	0.27	7.50	0.68	6.69	5.58	1.45	21.97	32.83	3.50
10 Extremely important	32.38	0.47	20.76	19.44	20.16	6.97	79.89	0.00	6.29	3.12
DON'T KNOW	11.38	7.55	14.05	21.67	63.59	31.81	5.78	59.73	25.32	0.30
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<N3G> How would you rate the importance of information from the Program, Utility, or Program Administrator training course?										
6	60.05	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 Extremely important	39.95	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00
n	*2*	*1*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<N3H> How would you rate the importance of information from the Program, Utility, or Program Administrator Marketing materials?										
0 Not at all important	4.76	1.30	29.18	5.07	0.00	0.00	1.31	18.30	24.00	0.00
1	6.53	12.14	0.00	13.64	0.00	0.00	0.08	0.00	4.39	0.00
2	3.52	3.45	0.00	9.04	0.00	0.00	0.00	0.00	0.00	66.35
3	2.04	0.00	1.68	12.48	2.74	0.00	0.00	0.00	0.00	0.00
4	2.74	4.08	0.00	0.10	0.00	4.35	3.14	0.00	0.00	10.80
5	3.02	1.20	14.95	2.43	13.04	7.20	1.50	8.79	0.00	11.47
6	2.04	0.32	0.00	8.93	0.00	18.17	0.00	0.00	15.35	4.45
7	8.50	6.07	25.05	13.76	3.38	17.90	5.15	0.00	10.36	0.00
8	32.98	64.79	6.58	12.15	10.96	8.89	19.07	21.97	13.83	3.50
9	14.24	0.00	1.68	5.30	37.63	11.46	36.38	0.00	16.97	0.00
10 Extremely important	10.96	0.15	19.03	11.25	21.10	14.28	19.63	50.94	1.14	3.12
DON'T KNOW	8.67	6.50	1.86	5.85	11.15	17.76	13.75	0.00	13.97	0.30
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<N3J> How would you rate the importance of standard practice in your business/industry?										
0 Not at all important	0.94	0.04	1.76	0.00	0.00	7.31	0.00	0.00	0.00	53.87
1	1.90	0.00	0.00	15.13	0.00	0.00	0.00	0.00	0.00	0.00
2	3.61	3.53	0.00	10.51	24.76	12.27	1.12	0.00	3.36	0.00
3	0.36	0.00	4.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	5.01	11.76	0.00	1.76	0.00	0.00	0.66	0.00	0.00	0.00
5	8.21	1.65	29.06	3.34	12.44	4.06	11.43	0.00	28.18	20.42
6	1.02	0.00	0.00	0.00	0.00	13.64	2.47	0.00	0.00	0.00
7	2.73	0.57	0.00	13.16	3.38	0.00	1.54	0.00	19.30	0.00
8	8.18	5.63	27.92	8.19	11.90	18.87	5.36	0.00	38.87	0.00
9	3.45	0.80	0.00	23.79	10.04	1.74	0.00	0.00	0.00	0.00
10 Extremely important	37.97	72.99	19.12	14.24	20.16	19.21	15.19	100.00	0.00	0.00
DON'T KNOW	26.64	3.04	17.55	9.88	17.33	22.89	62.24	0.00	10.29	25.71
n	*127*	*19*	*14*	*18*	*12*	*20*	*25*	*1*	*12*	*6*

<N3L> How would you rate the endorsement or recommendation by your account rep?										
0 Not at all important	0.25	0.00	0.00	0.00	23.09	0.00	0.00	0.00	0.00	0.00
2	1.61	2.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00
5	0.34	0.00	0.00	0.00	0.00	86.31	0.00	0.00	0.00	0.00
7	0.19	0.00	0.00	2.09	0.00	0.00	0.00	0.00	0.00	0.00
8	33.92	35.83	100.00	24.00	0.00	0.00	36.81	0.00	0.00	0.00
9	43.71	58.03	0.00	42.08	0.00	0.00	0.00	100.00	0.00	0.00
10 Extremely important	18.89	3.72	0.00	31.82	76.91	13.69	63.19	0.00	0.00	0.00
n	*26*	*6*	*1*	*7*	*2*	*2*	*5*	*1*	*1*	*1*
<N3M> How would you rate corporate policy or guidelines?										
0 Not at all important	3.82	0.55	0.00	14.02	0.00	12.42	2.87	0.00	0.00	53.87
1	2.29	0.00	0.00	15.13	24.76	0.00	0.00	0.00	3.36	0.00
2	2.29	3.53	10.09	0.00	6.00	5.25	0.00	0.00	0.00	0.00
3	0.86	0.00	5.54	1.76	2.74	5.92	0.00	0.00	7.54	0.00
4	0.99	0.00	0.00	0.00	0.00	8.47	2.55	0.00	0.00	0.00
5	6.64	0.79	22.42	13.54	7.07	10.22	6.71	0.00	7.42	16.82
6	1.13	0.00	0.00	4.83	0.00	7.02	1.27	0.00	0.00	0.00
7	1.62	0.80	8.71	0.00	3.35	10.06	0.00	0.00	19.30	16.32
8	5.37	1.37	9.32	17.43	0.00	10.73	2.81	0.00	46.95	12.64
9	4.22	5.11	0.00	12.05	12.87	9.77	1.12	0.00	3.32	0.00
10 Extremely important	45.77	78.35	33.31	13.23	20.16	20.14	28.66	100.00	0.00	0.00
DON'T KNOW	25.00	9.49	10.60	8.01	23.05	0.00	54.01	0.00	12.12	0.35
n	*127*	*19*	*14*	*18*	*12*	*20*	*25*	*1*	*12*	*6*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<N3N> How would you rate payback or return on investment of installing this equipment?										
0 Not at all important	0.20	0.12	0.00	0.83	0.00	0.00	0.00	0.00	1.67	0.00
1	0.14	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1.23	0.00	0.30	8.03	0.00	0.00	0.00	0.00	0.40	0.00
3	0.20	0.00	0.00	0.44	0.00	6.49	0.00	0.00	2.41	0.61
4	0.46	0.91	0.00	0.43	3.35	0.00	0.00	0.00	1.32	0.00
5	1.31	0.71	0.00	4.83	9.69	0.00	0.00	0.00	9.83	0.00
6	3.49	3.45	8.02	4.64	0.00	1.28	2.33	0.00	4.46	0.00
7	19.46	0.12	1.95	16.79	2.74	9.04	48.69	0.00	4.53	0.00
8	7.76	3.91	13.39	8.67	28.13	11.91	9.24	0.00	15.65	0.00
9	14.72	25.22	7.04	17.41	12.87	15.56	3.88	8.79	24.37	13.94
10 Extremely important	49.33	63.97	61.70	35.38	43.21	42.58	35.87	91.21	30.44	85.15
REFUSED	0.07	0.00	0.00	0.00	0.00	6.64	0.00	0.00	0.00	0.00
DON'T KNOW	1.62	1.22	7.61	2.55	0.00	6.49	0.00	0.00	4.92	0.30
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<N3O> How would you rate improved product quality?										
0 Not at all important	0.33	0.00	0.00	2.00	0.00	0.00	0.00	0.00	1.33	0.00
2	0.26	0.00	0.00	0.00	0.00	1.50	0.00	18.30	0.00	4.45
3	0.03	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.06	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.00
5	3.45	3.57	2.81	1.13	0.00	0.00	2.74	0.00	0.00	59.99
6	0.85	0.00	0.86	3.89	3.35	3.76	0.00	0.00	5.23	0.00
7	4.52	1.42	5.03	18.77	6.00	18.25	1.02	0.00	7.84	0.00
8	8.79	4.48	18.95	12.08	7.07	25.15	7.08	8.79	33.29	17.84
9	12.29	19.68	14.09	14.80	6.18	15.92	4.01	0.00	10.32	0.00
10 Extremely important	67.30	70.47	49.50	46.38	77.41	33.89	82.21	72.91	39.67	6.62
DON'T KNOW	2.13	0.18	8.75	0.96	0.00	1.54	2.94	0.00	1.91	11.11
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<N3SS> Using the same zero to 10 scale, how would you rate the influence of this factor?										
0 Not at all important	0.25	14.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	3.23	0.00	0.00	32.32	0.00	0.00	0.00	0.00	0.00	0.00
5	0.44	0.00	9.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	5.03	14.58	0.00	0.00	0.00	0.00	5.81	0.00	0.00	0.00
7	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.18	0.00
8	1.65	70.82	0.00	0.00	0.00	0.00	0.00	0.00	41.63	0.00
9	5.20	0.00	12.73	38.61	0.00	0.00	0.90	0.00	0.00	0.00
10 Extremely important	84.18	0.00	78.04	29.08	0.00	100.00	93.29	0.00	55.20	0.00
n	*30*	*3*	*3*	*10*	*0*	*1*	*9*	*0*	*4*	*0*
<P1> What financial calculations does your company typically make before proceeding with the installation of energy efficient equipment like you installed through the program?										
Payback	92.92	98.17	100.00	63.70	56.14	100.00	95.61	100.00	85.43	98.62
Return on investment	95.31	98.37	100.00	85.14	41.29	100.00	94.78	100.00	94.58	98.62
Other	100.00	100.00	0.00	100.00	100.00	0.00	100.00	0.00	100.00	100.00
REFUSED	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DON'T KNOW	22.16	0.00	0.00	22.50	0.00	100.00	23.95	0.00	85.47	0.00
n	*58*	*10*	*4*	*10*	*6*	*4*	*17*	*1*	*3*	*3*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<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										
0 to 6 months	1.63	0.00	0.00	2.12	0.00	0.00	3.60	0.00	0.00	0.00
6 months to 1 year	7.11	0.00	0.00	0.00	0.00	30.18	17.34	0.00	0.00	0.00
1 to 2 years	23.57	38.82	39.96	7.04	54.65	36.08	7.72	0.00	30.91	50.15
2 to 3 years	31.66	60.13	34.49	0.00	0.00	0.00	6.66	0.00	0.00	0.00
3 to 5 years	28.63	0.69	11.88	79.98	0.00	33.74	51.06	100.00	69.09	0.00
Over 5 years	2.51	0.37	0.00	10.85	0.00	0.00	3.09	0.00	0.00	49.85
REFUSED	1.16	0.00	0.00	0.00	0.00	0.00	2.86	0.00	0.00	0.00
DON'T KNOW	3.73	0.00	13.68	0.00	45.35	0.00	7.67	0.00	0.00	0.00
n	*47*	*8*	*4*	*8*	*3*	*4*	*15*	*1*	*2*	*2*
<P3> Did the rebate move your energy efficient equipment project within this acceptable range?										
Yes	87.68	90.62	94.81	96.44	100.00	60.60	82.38	100.00	22.73	49.46
No	7.62	9.38	0.00	0.00	0.00	0.00	8.84	0.00	34.25	49.16
REFUSED	0.88	0.00	0.00	0.00	0.00	0.00	2.29	0.00	0.00	1.38
DON'T KNOW	3.83	0.00	5.19	3.56	0.00	39.40	6.50	0.00	43.02	0.00
n	*95*	*17*	*9*	*17*	*7*	*9*	*25*	*1*	*7*	*3*
<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?										
6	0.77	0.00	0.00	5.16	5.54	0.00	0.00	0.00	0.00	0.00
7	3.81	0.00	2.80	1.01	12.13	0.00	9.46	0.00	0.00	0.00
8	42.77	58.56	0.00	6.53	0.00	32.14	48.25	0.00	26.40	0.00
9	22.02	30.37	0.00	27.09	6.82	0.00	14.81	0.00	0.00	100.00
10 Extremely important	30.46	11.07	97.21	60.21	75.50	34.77	27.48	100.00	59.03	0.00
DON'T KNOW	0.17	0.00	0.00	0.00	0.00	33.09	0.00	0.00	14.57	0.00
n	*71*	*14*	*8*	*16*	*7*	*4*	*17*	*1*	*3*	*1*
<N41> How many of the ten points would you give to the importance of the PROGRAM in your decision?										
0	1.32	3.02	0.00	0.00	0.00	0.00	0.00	0.00	10.67	0.00
1	0.33	0.56	0.30	0.36	0.00	0.00	0.00	0.00	2.42	0.00
2	1.51	0.85	0.00	8.03	0.00	0.00	0.00	0.00	0.00	0.00
3	7.25	0.83	0.00	11.59	0.00	0.00	15.23	0.00	0.40	3.12
4	1.68	0.00	5.09	4.21	6.18	0.00	0.91	0.00	11.60	0.00
5	15.00	7.69	27.57	13.47	6.00	40.26	18.84	21.97	38.69	0.00
6	34.77	54.52	15.87	8.09	0.00	3.76	37.08	0.00	0.00	0.00
7	16.33	26.49	1.93	18.66	14.34	14.92	8.51	0.00	12.13	24.75
8	8.10	1.24	2.81	21.62	3.35	6.62	8.80	0.00	11.32	60.96
9	2.89	3.45	0.00	3.65	0.00	5.14	2.14	8.79	3.72	10.87
10	9.75	1.17	43.34	10.33	70.14	23.69	6.75	69.24	4.12	0.30
DON'T KNOW	1.07	0.18	3.08	0.00	0.00	5.60	1.73	0.00	4.94	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<N42> And how many points would you give to all of these other non-program factors?										
0	9.75	1.17	43.34	10.33	70.14	23.69	6.75	69.24	4.12	0.30
1	2.75	3.45	0.00	2.70	0.00	5.14	2.14	8.79	3.72	10.87
2	8.10	1.24	2.81	21.62	3.35	6.62	8.80	0.00	11.32	60.96
3	16.33	26.49	1.93	18.66	14.34	14.92	8.51	0.00	12.13	24.75
4	34.77	54.52	15.87	8.09	0.00	3.76	37.08	0.00	0.00	0.00
5	15.00	7.69	27.57	13.47	6.00	40.26	18.84	21.97	38.69	0.00
6	1.68	0.00	5.09	4.21	6.18	0.00	0.91	0.00	11.60	0.00
7	7.25	0.83	0.00	11.59	0.00	0.00	15.23	0.00	0.40	3.12
8	1.51	0.85	0.00	8.03	0.00	0.00	0.00	0.00	0.00	0.00
9	0.33	0.56	0.30	0.36	0.00	0.00	0.00	0.00	2.42	0.00
10	1.32	3.02	0.00	0.00	0.00	0.00	0.00	0.00	10.67	0.00
DON'T KNOW	1.22	0.18	3.08	0.96	0.00	5.60	1.73	0.00	4.94	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<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?										
0	1.71	3.13	1.38	0.00	0.00	0.00	0.00	0.00	21.87	0.00
1	17.81	49.02	0.00	0.73	0.00	0.00	0.00	0.00	0.00	3.12
2	2.52	0.00	0.00	11.94	0.00	0.00	1.97	0.00	0.00	4.45
3	0.58	0.13	0.00	3.57	0.00	0.00	0.00	0.00	0.00	0.00
4	1.00	0.00	3.95	4.12	0.00	0.00	0.00	0.00	2.83	0.00
5	15.79	7.40	16.99	4.48	14.34	38.84	29.44	0.00	22.19	0.00
6	14.01	0.83	9.99	6.94	0.00	4.86	34.64	0.00	2.38	0.00
7	10.70	12.16	1.68	19.39	6.00	5.43	7.97	21.97	1.37	13.94
8	15.78	15.96	12.26	24.04	6.18	28.74	12.93	8.79	19.43	10.47
9	6.12	8.76	0.86	1.95	0.00	1.46	6.45	0.00	11.67	10.87
10	13.67	2.43	52.78	22.59	73.48	15.06	6.40	69.24	15.27	56.84
DON'T KNOW	0.31	0.18	0.11	0.25	0.00	5.60	0.19	0.00	2.99	0.30
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<N42P> and how many points would you give to all of these other non-program factors?										
0	13.67	2.43	52.78	22.59	73.48	15.06	6.40	69.24	15.27	56.84
1	6.12	8.76	0.86	1.95	0.00	1.46	6.45	0.00	11.67	10.87
2	15.78	15.96	12.26	24.04	6.18	28.74	12.93	8.79	19.43	10.47
3	10.70	12.16	1.68	19.39	6.00	5.43	7.97	21.97	1.37	13.94
4	14.01	0.83	9.99	6.94	0.00	4.86	34.64	0.00	2.38	0.00
5	15.79	7.40	16.99	4.48	14.34	38.84	29.44	0.00	22.19	0.00
6	1.00	0.00	3.95	4.12	0.00	0.00	0.00	0.00	2.83	0.00
7	0.58	0.13	0.00	3.57	0.00	0.00	0.00	0.00	0.00	0.00
8	2.52	0.00	0.00	11.94	0.00	0.00	1.97	0.00	0.00	4.45
9	17.81	49.02	0.00	0.73	0.00	0.00	0.00	0.00	0.00	3.12
10	1.71	3.13	1.38	0.00	0.00	0.00	0.00	0.00	21.87	0.00
DON'T KNOW	0.31	0.18	0.11	0.25	0.00	5.60	0.19	0.00	2.99	0.30
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<REPLACE> Was the installation of this measure a replacement of existing equipment or was it additional equipment you installed in your facility?										
Replace/Modification/Retrofit	80.23	50.51	100.00	94.27	93.82	100.00	98.23	100.00	81.38	99.70
Add-on	18.52	49.02	0.00	2.85	6.18	0.00	1.04	0.00	0.00	0.30
DON'T KNOW	1.25	0.46	0.00	2.89	0.00	0.00	0.73	0.00	18.62	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<N5> 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?										
0 Not at all likely	19.75	4.97	53.54	2.78	57.45	49.98	20.75	69.24	22.97	66.53
1	3.66	0.60	5.02	13.37	0.00	5.43	1.42	0.00	0.00	0.00
2	1.95	0.23	3.57	5.68	0.00	0.00	0.59	8.79	8.21	0.00
3	8.20	18.91	4.49	8.44	3.60	0.87	4.22	0.00	0.33	8.59
4	6.15	22.79	0.00	1.42	0.00	14.74	0.00	21.97	3.08	10.90
5	21.55	1.83	3.23	12.96	0.00	9.92	41.69	0.00	38.18	13.99
6	2.70	0.00	11.06	1.46	0.00	8.55	2.75	0.00	2.56	0.00
7	8.66	0.45	2.13	5.47	13.53	3.21	16.88	0.00	5.83	0.00
8	5.16	14.04	2.97	4.77	2.92	0.00	1.71	0.00	3.48	0.00
9	2.01	0.00	0.00	11.35	0.00	1.46	0.00	0.00	0.00	0.00
10 Extremely likely	17.25	35.56	13.98	32.29	9.81	0.89	3.91	0.00	13.61	0.00
DON'T KNOW	2.96	0.62	0.00	0.00	12.68	4.95	6.08	0.00	1.75	0.00
n	*243*	*27*	*30*	*57*	*11*	*30*	*37*	*4*	*38*	*9*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<N5AA> 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?										
0 Not at all likely	0.43	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00
2	0.24	0.00	0.00	10.38	0.00	0.00	0.00	0.00	0.00	0.00
6	1.91	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00
8	2.08	0.00	0.00	89.62	0.00	0.00	0.00	0.00	0.00	100.00
10 Extremely likely	95.34	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n	*6*	*1*	*0*	*2*	*1*	*0*	*1*	*0*	*0*	*1*
<NN5AA> Would you like for me to change your score on the importance of the rebate and/or change your rating on the likelihood you would install the same equipment without the rebate and/or we can change both if you wish?										
No change	58.16	34.22	0.00	89.48	100.00	0.00	85.04	0.00	0.00	0.00
Record how they would rate rebate influence and how they would rate likelihood to install without the rebate	40.14	65.78	0.00	10.52	0.00	0.00	14.96	0.00	100.00	0.00
DON'T KNOW	1.70	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n	*20*	*3*	*1*	*9*	*1*	*0*	*5*	*0*	*1*	*0*
<REVISED_N3B> How would you rate the importance of the availability of the PROGRAM rebate?										
4	1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
7	85.76	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 Extremely important	13.17	0.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00	0.00
n	*5*	*1*	*0*	*1*	*0*	*0*	*2*	*0*	*1*	*0*
<REVISED_N5> 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?										
7	4.89	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00
8	95.11	100.00	0.00	100.00	0.00	0.00	0.00	0.00	100.00	0.00
n	*5*	*1*	*0*	*1*	*0*	*0*	*2*	*0*	*1*	*0*
<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?										
0 Not at all likely	24.79	14.03	51.33	12.46	57.45	59.76	23.58	69.24	26.36	74.13
1	4.19	0.60	8.46	13.90	0.00	5.37	0.91	0.00	13.66	0.00
2	2.92	1.54	1.86	4.02	7.13	0.87	3.18	8.79	5.38	0.00
3	19.96	9.00	9.70	4.03	9.99	0.00	38.09	0.00	0.00	15.02
4	7.25	22.79	0.91	7.84	0.00	9.04	0.00	21.97	6.08	4.46
5	7.21	1.83	4.32	14.84	9.81	9.15	7.04	0.00	25.38	0.00
6	0.39	0.00	2.14	0.61	0.00	4.79	0.00	0.00	0.00	0.00
7	12.26	39.95	2.02	0.33	0.00	1.93	6.86	0.00	2.80	0.00
8	6.15	0.26	0.00	0.39	2.92	0.00	14.26	0.00	2.66	0.00
9	2.62	0.00	0.00	14.88	0.00	0.00	0.00	0.00	0.00	0.00
10 Extremely likely	9.25	9.38	19.26	26.69	0.00	0.89	0.00	0.00	15.92	6.38
DON'T KNOW	3.01	0.62	0.00	0.00	12.68	8.21	6.08	0.00	1.75	0.00
n	*243*	*27*	*30*	*57*	*11*	*30*	*37*	*4*	*38*	*9*
<N6> If the program had not been available, which of the following alternatives would you have been MOST likely to do?										
Install/Delamped fewer units	3.12	6.05	0.00	1.46	0.00	5.00	1.25	21.97	1.03	0.00
Install standard efficiency equipment or whatever required by code	8.04	11.51	8.41	3.31	11.15	4.78	4.76	8.79	5.97	49.55
Installed equipment more efficient than code but less efficient than what you installed through the program	6.83	14.29	2.69	5.31	0.00	5.69	1.24	0.00	6.45	3.12
Done nothing (keep existing equipment as is)	19.23	6.18	43.88	29.52	39.45	47.89	19.61	18.30	29.70	36.22
Done the same thing I would have done as I did through the program	38.25	53.61	22.03	51.46	17.95	12.54	24.17	0.00	40.25	0.30
Repair/rewind or overhaul the existing equipment	17.63	1.82	12.95	5.72	24.76	15.05	40.90	50.94	2.03	10.81
Something else	4.15	6.32	10.04	0.34	6.69	0.00	2.30	0.00	6.28	0.00
DON'T KNOW	2.75	0.22	0.00	2.89	0.00	9.04	5.78	0.00	8.30	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<N6AA> Would you have acted at the same time as you did under the program, within a year, or at a later time?										
Same time	51.19	62.74	82.24	36.47	0.00	0.00	28.55	0.00	72.39	0.00
Within one year	21.24	6.87	4.58	46.95	61.68	14.62	43.76	100.00	11.98	0.00
At a later time	25.25	30.39	13.18	16.58	0.00	65.39	17.42	0.00	14.88	99.43
DON'T KNOW	2.33	0.00	0.00	0.00	38.32	19.98	10.26	0.00	0.74	0.57
n	*122*	*17*	*9*	*35*	*4*	*13*	*19*	*2*	*19*	*4*
<N6AC> Would it have been…										
Less than one year	0.55	0.00	0.00	0.00	0.00	6.23	0.00	0.00	0.00	0.00
About a year	14.82	0.00	93.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A couple of years	52.22	0.00	0.00	54.86	0.00	74.76	100.00	0.00	0.00	0.00
A few years	21.75	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
More than four years	1.68	0.00	0.00	0.00	0.00	19.01	0.00	0.00	0.00	0.00
DON'T KNOW	8.97	0.00	6.25	45.14	0.00	0.00	0.00	0.00	0.00	0.00
n	*9*	*1*	*2*	*2*	*0*	*3*	*1*	*0*	*0*	*0*
<N6BA> How long would you have waited to replace your equipment?										
Less than one year	2.17	0.00	0.53	5.66	0.00	3.36	1.96	0.00	0.00	0.00
About a year	3.88	0.00	0.00	16.12	0.00	6.81	0.00	0.00	0.00	0.00
A couple of years	13.10	62.70	0.00	0.00	27.78	11.61	9.62	0.00	42.85	1.67
A few years	15.61	2.38	37.19	12.26	0.00	32.99	10.46	100.00	3.40	0.00
More than four years	53.05	13.19	24.16	65.97	32.70	23.65	77.95	0.00	49.28	68.32
DON'T KNOW	12.18	21.73	38.12	0.00	39.51	21.59	0.00	0.00	4.47	30.01
n	*84*	*9*	*14*	*15*	*6*	*13*	*10*	*1*	*12*	*4*
<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?										
Same time	2.40	0.00	20.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Within one year	12.30	0.00	79.90	0.00	0.00	0.00	6.99	0.00	0.00	0.00
At a later time	48.77	100.00	0.00	10.56	100.00	100.00	21.45	0.00	59.62	0.00
DON'T KNOW	36.53	0.00	0.00	89.44	0.00	0.00	71.57	0.00	40.38	0.00
n	*16*	*2*	*2*	*2*	*1*	*1*	*3*	*0*	*5*	*0*
<N6CB> How many years later would it have been?										
1	2.36	3.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	6.57	0.00	0.00	0.00	100.00	0.00	0.00	0.00	72.21	0.00
3	85.11	96.63	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00
5	4.41	0.00	0.00	100.00	0.00	100.00	0.00	0.00	0.00	0.00
DON'T KNOW	1.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.79	0.00
n	*8*	*2*	*0*	*1*	*1*	*1*	*1*	*0*	*2*	*0*
<ER2> How many more years do you think your equipment would have gone before failing and required replacement?										
1	2.01	0.00	0.00	3.60	0.00	0.00	0.00	0.00	0.00	0.00
2	17.45	0.00	100.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00
5	54.18	0.00	0.00	96.40	0.00	0.00	0.00	0.00	100.00	0.00
10	2.65	0.00	0.00	0.00	47.56	0.00	0.00	0.00	0.00	0.00
20	2.92	0.00	0.00	0.00	52.44	0.00	0.00	0.00	0.00	0.00
DON'T KNOW	20.80	100.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00
n	*13*	*2*	*3*	*3*	*2*	*1*	*1*	*0*	*1*	*0*
<ER6> How much downtime did you experience in the past year?										
0	24.67	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00
8	75.33	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00
n	*2*	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*0*

	ALL	PGE_LED_HIGHBAY (%)	PGE_LED_LOWBAY (%)	PGE_LED_OUTDOOR_FIXTURE (%)	SCE_LED_HIGHBAY (%)	SCE_LED_LOWBAY (%)	SCE_LED_OUTDOOR_FIXTURE (%)	SDGE_LED_HIGHBAY (%)	SDGE_LED_LOWBAY (%)	SDGE_LED_OUTDOOR_FIXTURE (%)
<ER9> In your opinion, based on the economics of operating this equipment, for how many more years could you have kept this equipment functioning?										
3	8.58	0.00	10.17	0.00	0.00	0.00	47.51	0.00	0.00	0.00
5	57.92	28.28	0.00	96.40	77.87	0.00	0.00	0.00	100.00	0.00
7	0.42	0.00	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	17.76	0.00	84.98	0.00	10.53	0.00	52.50	0.00	0.00	0.00
20	2.15	0.00	0.00	0.00	11.61	0.00	0.00	0.00	0.00	0.00
Refused	1.48	0.00	0.00	3.60	0.00	0.00	0.00	0.00	0.00	0.00
DON'T KNOW	11.70	71.72	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00
n	*16*	*2*	*4*	*3*	*3*	*1*	*2*	*0*	*1*	*0*
<PP4> How would you rate your OVERALL satisfaction with the PROGRAM?										
0 Completely dissatisfied	0.47	0.12	0.00	1.60	0.00	0.00	0.00	0.00	8.74	0.00
2	1.35	3.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.03	0.00	0.23	0.10	0.00	0.00	0.00	0.00	0.00	0.00
5	3.30	0.00	0.30	10.95	0.00	3.26	3.43	18.30	11.62	0.00
6	0.85	1.15	0.00	0.54	3.35	0.00	0.19	0.00	4.46	10.80
7	14.77	0.38	4.65	8.73	6.00	0.00	36.89	0.00	0.81	24.76
8	10.46	15.91	7.43	4.11	3.38	23.83	6.37	8.79	7.73	56.91
9	14.34	21.43	20.16	23.48	0.00	24.68	2.51	0.00	15.48	0.61
10 Completely satisfied	51.73	57.08	67.23	48.84	87.28	43.28	44.83	72.91	33.82	6.93
DON'T KNOW	2.70	0.18	0.00	1.65	0.00	4.95	5.78	0.00	17.34	0.00
n	*255*	*30*	*30*	*60*	*12*	*30*	*39*	*4*	*40*	*10*
<LT3> During this time, how many times has your organization participated in these PROGRAM(s)?										
7 to 10 times, or more	30.52	21.52	52.31	19.87	0.00	21.03	40.47	0.00	4.10	27.61
4 to 7 times	11.44	2.78	0.00	0.00	0.00	0.00	24.94	0.00	0.00	0.00
2 to 4 times	15.90	17.49	16.88	23.25	77.86	52.50	11.57	0.00	12.67	8.96
less than 2 times	36.05	58.17	30.82	27.74	22.14	26.47	15.45	0.00	44.82	63.43
REFUSED	1.17	0.05	0.00	8.97	0.00	0.00	1.01	0.00	0.00	0.00
DON'T KNOW	4.91	0.00	0.00	20.17	0.00	0.00	6.56	0.00	38.41	0.00
n	*81*	*14*	*8*	*11*	*4*	*10*	*21*	*0*	*9*	*4*

<CA6> What type of equipment did you install through this (these) program(s)?										
Indoor lighting	41.78	25.53	100.00	91.80	100.00	92.55	40.43	0.00	100.00	64.35
Cooling equipment	17.56	19.77	0.00	62.75	0.00	0.00	4.58	0.00	100.00	43.65
Natural gas equipment, such as water heater, furnace or appliances	13.66	17.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.65
Insulation or windows	1.79	0.00	0.00	62.75	0.00	0.00	0.00	0.00	0.00	0.00
Refrigeration	16.73	18.96	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Industrial process equipment	17.35	22.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Greenhouse heat curtains	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Food service equipment	13.43	17.86	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
Other	12.88	1.46	100.00	81.42	0.00	78.87	16.57	0.00	100.00	0.00
REFUSED	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DON'T KNOW	29.15	0.00	0.00	0.00	0.00	81.24	59.18	0.00	100.00	0.00
n	*68*	*13*	*8*	*9*	*4*	*8*	*16*	*0*	*6*	*4*
<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?										
Yes ALWAYS	32.89	34.90	3.28	100.00	0.00	100.00	30.16	0.00	100.00	100.00
No ALWAYS	65.88	60.02	96.72	0.00	0.00	0.00	69.84	0.00	0.00	0.00
DON'T KNOW	1.23	5.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n	*26*	*9*	*4*	*2*	*0*	*1*	*8*	*0*	*1*	*1*

*** Values are shown as percent of respondents.**

*** n is the number of respondents.**

APPENDIX E MEASURE NAME TO ESPI MEASURE MAPPING

PA	Measure Group	Measure Name	ESPI Measure
PG&E	LIGHTING INDOOR LED FIXTURE	1x4 LED Integrated retrofit kit rated 110 and <125 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	1x4 LED Integrated retrofit kit rated 125 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	1x4 LED new Luminaire rated 110 and <125 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	1x4 LED new Luminaire rated 125 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	1x4 LED new Luminaire rated 95 and <110 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	2x2 LED Integrated retrofit kit rated 110 and <125 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	2x2 LED Integrated retrofit kit rated 125 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	2x2 LED new Luminaire rated 110 and <125 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	2x2 LED new Luminaire rated 125 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	2x2 LED new Luminaire rated 95 and <110 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	2x4 LED Integrated retrofit kit rated 110 and <125 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	2x4 LED Integrated retrofit kit rated 125 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	2x4 LED Integrated retrofit kit rated 95 and <110 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	2x4 LED new Luminaire rated 110 and <125 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	2x4 LED new Luminaire rated 125 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY

PA	Measure Group	Measure Name	ESPI Measure
PG&E	LIGHTING INDOOR LED FIXTURE	2x4 LED new Luminaire rated 85 and <95 LPW, Ambient Interior Commercial Spaces	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	LED Downlight: Install 10 W to 12 W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED High/Low Bay: 40 to 131 watts, Replacing T8 Fluorescent 2nd generation 4L VHLO	LED_LOWBAY
PG&E	LIGHTING INDOOR LED FIXTURE	LED High/Low Bay: 40 to 131 watts, replacing 175W PS-MH	LED_HIGHBAY
PG&E	LIGHTING INDOOR LED FIXTURE	LED High/Low Bay: > 500 to 750 watts, replacing 1000W PS-MH	LED_HIGHBAY
PG&E	LIGHTING INDOOR LED FIXTURE	LED High/Low Bay: >131 to 160 watts, Replacing T8 Fluorescent 2nd generation 6L VHLO	LED_HIGHBAY
PG&E	LIGHTING INDOOR LED FIXTURE	LED High/Low Bay: >131 to 160 watts, replacing 200W PS-MH	LED_HIGHBAY
PG&E	LIGHTING INDOOR LED FIXTURE	LED High/Low Bay: >160 to 187 watts, replacing 250 W PS-MH	LED_HIGHBAY
PG&E	LIGHTING INDOOR LED FIXTURE	LED High/Low Bay: >160 to 220 watts, Replacing T8 Fluorescent 2nd generation 8L VHLO	LED_HIGHBAY
PG&E	LIGHTING INDOOR LED FIXTURE	LED High/Low Bay: >187 to 220 watts, replacing 320W PS-MH	LED_HIGHBAY
PG&E	LIGHTING INDOOR LED FIXTURE	LED High/Low Bay: >220 to 262 watts, replacing 350W PS-MH	LED_HIGHBAY
PG&E	LIGHTING INDOOR LED FIXTURE	LED High/Low Bay: >262 to 280 watts, replacing 400W PS-MH	LED_HIGHBAY
PG&E	LIGHTING INDOOR LED FIXTURE	LED High/Low Bay: >280 to 320 watts, replacing 450W PS-MH	LED_HIGHBAY
PG&E	LIGHTING INDOOR LED FIXTURE	LED High/Low Bay: >320 to 500 watts, replacing 750W PS-MH	LED_HIGHBAY
PG&E	LIGHTING INDOOR LED FIXTURE	LED Recessed Downlight: Install <10 W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Recessed Downlight: Install >12 W to 25 W LED	LED_DOWNLIGHT

PA	Measure Group	Measure Name	ESPI Measure
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 10 to <11W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 11 to <12W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 12 to <13W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 13 to <14W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 14 to <15W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 15 to <16W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 16 to <17W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 17 to <18W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 18 to <19W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 19 to <20W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 20 to <21W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 21 to <22W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 22 to <23W LED	LED_DOWNLIGHT

PA	Measure Group	Measure Name	ESPI Measure
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 23 to <24W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 24 to <25W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 25W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 7 to < 8W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 8 to < 9W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install 9 to < 10W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight: Install < 7W LED	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED FIXTURE	Lighting Retrofit/New-Int-LED-Recessed Downlights	LED_DOWNLIGHT
PG&E	LIGHTING INDOOR LED LAMP	10-Watt LED A-Lamp 1050-1489 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	10-Watt LED A-Lamp 310-749 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	10-Watt LED A-Lamp 750-1049 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	100W equivalent 100 LPW (lumens/watt)	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	100W equivalent 110 LPW (lumens/watt)	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	100W equivalent 90 LPW (lumens/watt)	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	11-Watt LED A-Lamp 1050-1489 Lumens	LED_A-LAMP

PA	Measure Group	Measure Name	ESPI Measure
PG&E	LIGHTING INDOOR LED LAMP	11-Watt LED A-Lamp 750-1049 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	12-Watt LED A-Lamp 1050-1489 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	12-Watt LED A-Lamp 750-1049 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	13-Watt LED A-Lamp 1050-1489 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	14-Watt LED A-Lamp 1050-1489 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	14-Watt LED A-Lamp 750-1049 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	15-Watt LED A-Lamp 1050-1489 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	15-Watt LED A-Lamp 1490-2600 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	16-Watt LED A-Lamp 1050-1489 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	16-Watt LED A-Lamp 1490-2600 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	17-Watt LED A-Lamp 1050-1489 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	17-Watt LED A-Lamp 1490-2600 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	18-Watt LED A-Lamp 1490-2600 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	19-Watt LED A-Lamp 1490-2600 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	40W equivalent 100 LPW (lumens/watt)	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	40W equivalent 68 LPW (lumens/watt)	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	40W equivalent 80 LPW (lumens/watt)	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	5-Watt LED A-Lamp 310-749 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	6-Watt LED A-Lamp 310-749 Lumens	LED_A-LAMP

PA	Measure Group	Measure Name	ESPI Measure
PG&E	LIGHTING INDOOR LED LAMP	60W equivalent 100 LPW (lumens/watt)	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	60W equivalent 110 LPW (lumens/watt)	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	60W equivalent 80 LPW (lumens/watt)	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	60W equivalent 90 LPW (lumens/watt)	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	7-Watt LED A-Lamp 310-749 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	7-Watt LED A-Lamp 750-1049 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	75W equivalent 100 LPW (lumens/watt)	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	75W equivalent 110 LPW (lumens/watt)	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	75W equivalent 120 LPW (lumens/watt)	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	75W equivalent 90 LPW (lumens/watt)	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	8-Watt LED A-Lamp 310-749 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	8-Watt LED A-Lamp 750-1049 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	9-Watt LED A-Lamp 310-749 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	9-Watt LED A-Lamp 750-1049 Lumens	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	LED A-Lamp 10 to < 11 watts	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	LED A-Lamp 11 to < 12 watts	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	LED A-Lamp 12 to < 13 watts	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	LED A-Lamp 13 to < 14 watts	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	LED A-Lamp 14 to < 15 watts	LED_A-LAMP

PA	Measure Group	Measure Name	ESPI Measure
PG&E	LIGHTING INDOOR LED LAMP	LED A-Lamp 15 to < 16 watts	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	LED A-Lamp 16 to < 17 watts	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	LED A-Lamp 17 to < 18 watts	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	LED A-Lamp 18 to < 19 watts	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	LED A-Lamp 19 to < 20 watts	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	LED A-Lamp 25 watts	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	LED A-Lamp 8 to < 9 watts	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	LED A-Lamp 9 to < 10 watts	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	LED A-Lamp < 8 watts	LED_A-LAMP
PG&E	LIGHTING INDOOR LED LAMP	LED Candelabra 3 to 5	LED_ACCENT
PG&E	LIGHTING INDOOR LED LAMP	LED Candelabra <3W	LED_ACCENT
PG&E	LIGHTING INDOOR LED LAMP	LED globe: 3 to 10 Watts	LED_ACCENT
PG&E	LIGHTING INDOOR LED LAMP	LED globe: <3 Watts	LED_ACCENT
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED MR-16: 10 to <11 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED MR-16: 11 to <12 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED MR-16: 6 to <7 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED MR-16: 7 to <8 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR	LED MR-16: 8 to <9 Watts	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
	LAMP		
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED MR-16: 9 to <10 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED MR-16: <6 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR16: 6 to < 7 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR16: 7 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR16: <6 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR20: 11 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR30: 10 to <11 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR30: 11 to <12 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR30: 12 to <13 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR30: 13 to <14 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR30: 14 to <15 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR30: 15 to <16 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR30: 16 to <17 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR	LED PAR30: 17 to <18 Watts	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
	LAMP		
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR30: 18 to <19 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR30: <10 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR38: 12 to <13 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR38: 13 to <14 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR38: 14 to <15 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR38: 15 to <16 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR38: 16 to <17 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR38: 17 to <18 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR38: 18 to <19 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR38: 19 to <20 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR38: 20 to <21 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR38: 21 to <22 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR38: 24 to <25 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR	LED PAR38: 26 to <27 Watts	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
	LAMP		
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR38: 27 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED PAR38: < 12 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED R-BR: 11 to <14 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED R-BR: 14 to 22 Watts	LED_REFLECTOR
PG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED R-BR: <11 Watts	LED_REFLECTOR
PG&E	LIGHTING OUTDOOR LED FIXTURE	LED Outdoor Area Lighting - Install 0-50 W Fixture	LED_OUTDOOR_FIXTURE
PG&E	LIGHTING OUTDOOR LED FIXTURE	LED Outdoor Area Lighting - Install 111-150 W Fixture	LED_OUTDOOR_FIXTURE
PG&E	LIGHTING OUTDOOR LED FIXTURE	LED Outdoor Area Lighting - Install 151-192 W Fixture	LED_OUTDOOR_FIXTURE
PG&E	LIGHTING OUTDOOR LED FIXTURE	LED Outdoor Area Lighting - Install 193-225 W Fixture	LED_OUTDOOR_FIXTURE
PG&E	LIGHTING OUTDOOR LED FIXTURE	LED Outdoor Area Lighting - Install 226-265 W Fixture	LED_OUTDOOR_FIXTURE
PG&E	LIGHTING OUTDOOR LED FIXTURE	LED Outdoor Area Lighting - Install 266-500 W Fixture	LED_OUTDOOR_FIXTURE
PG&E	LIGHTING OUTDOOR LED FIXTURE	LED Outdoor Area Lighting - Install 501-750 W Fixture	LED_OUTDOOR_FIXTURE
PG&E	LIGHTING OUTDOOR LED FIXTURE	LED Outdoor Area Lighting - Install 51-70 W Fixture	LED_OUTDOOR_FIXTURE
PG&E	LIGHTING OUTDOOR LED	LED Outdoor Area Lighting - Install 71-110 W Fixture	LED_OUTDOOR_FIXTURE

PA	Measure Group	Measure Name	ESPI Measure
	FIXTURE		
SCE	LIGHTING INDOOR LED FIXTURE	(1) 48in T8 Lamp LED replacing (1) 48in T8 Linear Fluorescent	LED_LOWBAY
SCE	LIGHTING INDOOR LED FIXTURE	255 to 325 Watt Ext LED Fixt mounted 15 to <24 ft with Motion Control & Photo Sensor in MF Common Areas LED replacing 575 Watt Pulse Start Metal Halide	LED_HIGHBAY
SCE	LIGHTING INDOOR LED FIXTURE	40 to 131 Watt High/Low Bay LED replacing (4) 48in T8 VHLO	LED_LOWBAY
SCE	LIGHTING INDOOR LED FIXTURE	40 to 131 Watt High/Low Bay LED replacing 175 Watt Pulse Start Metal Halide	LED_HIGHBAY
SCE	LIGHTING INDOOR LED FIXTURE	68 to 90 Watt Ext LED Fixt mounted 15 to <24 ft with Motion Control & Photo Sensor in MF Common Areas LED replacing 175 Watt Pulse Start Metal Halide	LED_HIGHBAY
SCE	LIGHTING INDOOR LED FIXTURE	= 15 Watt Down Light (Common Area) LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_DOWNLIGHT
SCE	LIGHTING INDOOR LED FIXTURE	= 15 Watt Down Light (Dwelling Area) LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_DOWNLIGHT
SCE	LIGHTING INDOOR LED FIXTURE	= 15 Watt Down Light (Non Res) LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_DOWNLIGHT
SCE	LIGHTING INDOOR LED FIXTURE	=110 and <125 LPW 2x4 Retrofit Kit LED replacing 2x4 T12 T8 or T5 Linear Fluorescent Fixture	LED_LOWBAY
SCE	LIGHTING INDOOR LED FIXTURE	=110 and <125 LPW 2x4 Retrofit Kit LED replacing 2x4 T8 or T5 Linear Fluorescent Fixture	LED_LOWBAY
SCE	LIGHTING INDOOR LED FIXTURE	=125 LPW 2x4 Luminaire LED replacing 2x4 T8 or T5 Linear Fluorescent Fixture	LED_LOWBAY
SCE	LIGHTING INDOOR LED FIXTURE	>131 to 160 Watt High/Low Bay LED replacing (6) 48in T8 VHLO	LED_HIGHBAY

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING INDOOR LED FIXTURE	>131 to 160 Watt High/Low Bay LED replacing 200 Watt Pulse Start Metal Halide	LED_HIGHBAY
SCE	LIGHTING INDOOR LED FIXTURE	>160 to 187 Watt High/Low Bay LED replacing 250 Watt Pulse Start Metal Halide	LED_HIGHBAY
SCE	LIGHTING INDOOR LED FIXTURE	>160 to 220 Watt High/Low Bay LED replacing (8) 48in T8 VHLO	LED_HIGHBAY
SCE	LIGHTING INDOOR LED FIXTURE	>220 to 262 Watt High/Low Bay LED replacing 350 Watt Pulse Start Metal Halide	LED_HIGHBAY
SCE	LIGHTING INDOOR LED FIXTURE	>262 to 280 Watt High/Low Bay LED replacing 400 Watt Pulse Start Metal Halide	LED_HIGHBAY
SCE	LIGHTING INDOOR LED FIXTURE	>280 to 320 Watt High/Low Bay LED replacing 450 Watt Pulse Start Metal Halide	LED_HIGHBAY
SCE	LIGHTING INDOOR LED FIXTURE	>320 to 500 Watt High/Low Bay LED replacing 750 Watt Pulse Start Metal Halide	LED_HIGHBAY
SCE	LIGHTING INDOOR LED FIXTURE	>500 to 750 Watt High/Low Bay LED replacing 1000 Watt Pulse Start Metal Halide	LED_HIGHBAY
SCE	LIGHTING INDOOR LED FIXTURE	Interior LED recessed surface and pendant-mounted downlights	LED_DOWNLIGHT
SCE	LIGHTING INDOOR LED FIXTURE	Interior LED recessed, surface and pendant-mounted downlights	LED_DOWNLIGHT
SCE	LIGHTING INDOOR LED FIXTURE	LED T8 Lamp UL Type A 4 foot	LED_LOWBAY
SCE	LIGHTING INDOOR LED LAMP	10 Watt to < 11 Watt A-Lamp (Common Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	10 Watt to < 11 Watt A-Lamp (Dwelling Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	10 Watt to < 11 Watt A-Lamp LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING INDOOR LED LAMP	100W Equivalent LED A-Lamp 100 LPW (lumens/watt) (Common Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	100W Equivalent LED A-Lamp 100 LPW (lumens/watt) (Dweilling Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	100W Equivalent LED A-Lamp 100 LPW (lumens/watt) (Residential) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	100W Equivalent LED A-Lamp 100 LPW (lumens/watt) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	100W Equivalent LED A-Lamp 110 LPW (lumens/watt) (Common Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	100W Equivalent LED A-Lamp 110 LPW (lumens/watt) (Dweilling Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	100W Equivalent LED A-Lamp 110 LPW (lumens/watt) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	100W Equivalent LED A-Lamp 90 LPW (lumens/watt) (Common Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	100W Equivalent LED A-Lamp 90 LPW (lumens/watt) (Dweilling Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	100W Equivalent LED A-Lamp 90 LPW (lumens/watt) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	11 Watt to < 12 Watt A-Lamp (Common Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	11 Watt to < 12 Watt A-Lamp (Dwelling Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	11 Watt to < 12 Watt A-Lamp LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	12 Watt to < 13 Watt A-Lamp (Common Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	12 Watt to < 13 Watt A-Lamp (Dwelling Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	13 Watt to < 14 Watt A-Lamp (Common Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING INDOOR LED LAMP	13 Watt to < 14 Watt A-Lamp LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	14 Watt to < 15 Watt A-Lamp (Common Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	15 Watt to < 16 Watt A-Lamp (Common Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	16 Watt to < 17 Watt A-Lamp (Common Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	17 Watt to < 18 Watt A-Lamp (Common Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	17 Watt to < 18 Watt A-Lamp (Dwelling Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	2 Watt to < 3 Watt Candelabra LED replacing Candelabra Basecase Total Watts = 7.35 x Msr Watts	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	3 Watt to 10 Watt Globe LED replacing Globe Basecase Total Watts = 4.94 x Msr Watts	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	3 Watt to < 4 Watt Candelabra (Common Area) LED replacing Candelabra Basecase Total Watts = 7.35 x Msr Watts	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	3 Watt to < 4 Watt Candelabra (Dwelling Area) LED replacing Candelabra Basecase Total Watts = 7.35 x Msr Watts	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	3 Watt to < 4 Watt Candelabra LED replacing Candelabra Basecase Total Watts = 7.35 x Msr Watts	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	40W Equivalent LED A-Lamp 100 LPW (lumens/watt) (Common Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	40W Equivalent LED A-Lamp 100 LPW (lumens/watt) (Dweilling Area) LED	LED_A-LAMP

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING INDOOR LED LAMP	40W Equivalent LED A-Lamp 100 LPW (lumens/watt) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	40W Equivalent LED A-Lamp 68 LPW (lumens/watt) (Common Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	40W Equivalent LED A-Lamp 68 LPW (lumens/watt) (Dweilling Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	40W Equivalent LED A-Lamp 68 LPW (lumens/watt) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	40W Equivalent LED A-Lamp 80 LPW (lumens/watt) (Common Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	40W Equivalent LED A-Lamp 80 LPW (lumens/watt) (Dweilling Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	40W Equivalent LED A-Lamp 80 LPW (lumens/watt) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	40W Equivalent LED A-Lamp 90 LPW (lumens/watt) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	60W Equivalent LED A-Lamp 100 LPW (lumens/watt) (Dweilling Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	60W Equivalent LED A-Lamp 100 LPW (lumens/watt) (Residential) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	60W Equivalent LED A-Lamp 80 LPW (lumens/watt) (Common Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	60W Equivalent LED A-Lamp 80 LPW (lumens/watt) (Dweilling Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	60W Equivalent LED A-Lamp 80 LPW (lumens/watt) (Residential) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	60W Equivalent LED A-Lamp 80 LPW (lumens/watt) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	60W Equivalent LED A-Lamp 90 LPW (lumens/watt) (Common Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	60W Equivalent LED A-Lamp 90 LPW (lumens/watt) (Dweilling Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	60W Equivalent LED A-Lamp 90 LPW (lumens/watt) (Residential) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	60W Equivalent LED A-Lamp 90 LPW (lumens/watt) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	75W Equivalent LED A-Lamp 100 LPW (lumens/watt) (Common Area) LED	LED_A-LAMP

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING INDOOR LED LAMP	75W Equivalent LED A-Lamp 100 LPW (lumens/watt) (Dweilling Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	75W Equivalent LED A-Lamp 100 LPW (lumens/watt) (Residential) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	75W Equivalent LED A-Lamp 100 LPW (lumens/watt) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	75W Equivalent LED A-Lamp 110 LPW (lumens/watt) (Common Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	75W Equivalent LED A-Lamp 110 LPW (lumens/watt) (Dweilling Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	75W Equivalent LED A-Lamp 110 LPW (lumens/watt) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	75W Equivalent LED A-Lamp 120 LPW (lumens/watt) (Dweilling Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	75W Equivalent LED A-Lamp 90 LPW (lumens/watt) (Common Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	75W Equivalent LED A-Lamp 90 LPW (lumens/watt) (Dweilling Area) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	75W Equivalent LED A-Lamp 90 LPW (lumens/watt) (Residential) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	75W Equivalent LED A-Lamp 90 LPW (lumens/watt) LED	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	8 Watt to < 9 Watt A-Lamp (Common Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	8 Watt to < 9 Watt A-Lamp (Dwelling Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	8 Watt to < 9 Watt A-Lamp LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	9 Watt to < 10 Watt A-Lamp (Common Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	9 Watt to < 10 Watt A-Lamp (Dwelling Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING INDOOR LED LAMP	9 Watt to < 10 Watt A-Lamp LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	< 8 Watt A-Lamp (Common Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	< 8 Watt A-Lamp (Dwelling Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	< 8 Watt A-Lamp LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	<3 Watt Candelabra LED replacing Candelabra Basecase Total Watts = 7.35 x Msr Watts	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	=3 Watt to =5 Watt Candelabra (Common Area) LED replacing Candelabra Basecase Total Watts = 7.35 x Msr Watts	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	=3 Watt to =5 Watt Candelabra (Dwelling Area) LED replacing Candelabra Basecase Total Watts = 7.35 x Msr Watts	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	=3 Watt to =5 Watt Candelabra LED replacing Candelabra Basecase Total Watts = 7.35 x Msr Watts	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	=3 to =10 Watts Globe LED	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	> 10 to 30 Watt A-Lamp LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	>= 4 Watt Candelabra (Common Area) LED replacing Candelabra Basecase Total Watts = 7.35 x Msr Watts	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	>= 4 Watt Candelabra (Dwelling Area) LED replacing Candelabra Basecase Total Watts = 7.35 x Msr Watts	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	>= 4 Watt Candelabra LED replacing Candelabra Basecase Total Watts = 7.35 x Msr Watts	LED_ACCENT

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING INDOOR LED LAMP	LED Lamp: A19 10 Watts non-dimmable	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	LED Lamp: A19 18 Watts non-dimmable	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	LED Lamp: A19 4 Watts non-dimmable	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	LED Lamp: A19 9 Watts non-dimmable	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	LED Lamp: CanRet 8 Watts non-dimmable	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	LED Lamp: Candle 3 Watts non-dimmable	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	LED Lamp: Candle 5 Watts non-dimmable	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	LED Lamp: Glb 2 Watts non-dimmable	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	LED Lamp: Glb 3 Watts non-dimmable	LED_ACCENT
SCE	LIGHTING INDOOR LED LAMP	Up to 10 Watt A-Lamp LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED LAMP	Up to 10 Watt Exterior A-Lamp (Common Area) LED replacing A19 Basecase Total Watts = 2.96 x Msr Watts	LED_A-LAMP
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	10 Watt to < 11 Watt MR16 LED replacing MR16 Basecase Total Watts = 4.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	10 Watt to < 11 Watt PAR30 (Common Area) LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	10 Watt to < 11 Watt PAR30 (Dwelling Area) LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	10 Watt to < 11 Watt PAR30 (Res) LED replacing PAR30 Basecase Total Watts = 2.94 x Msr Watts	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	10 Watt to < 11 Watt PAR30 LED replacing PAR30 Basecase Total Watts = 2.94 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	11 Watt to < 12 Watt MR16 LED replacing MR16 Basecase Total Watts = 4.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	11 Watt to < 12 Watt PAR30 (Common Area) LED replacing PAR30 Basecase Total Watts = 2.94 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	11 Watt to < 12 Watt PAR30 (Dwelling Area) LED replacing PAR30 Basecase Total Watts = 2.94 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	11 Watt to < 12 Watt PAR30 (Res) LED replacing PAR30 Basecase Total Watts = 2.94 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	11 Watt to < 12 Watt PAR30 LED replacing PAR30 Basecase Total Watts = 2.94 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	11 Watt to < 12 Watt PAR30 LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	11 to <14 Watts R-BR Lamp (Common Area) LED replacing R-BR Basecase Total Watts = 4.13 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	11 to <14 Watts R-BR Lamp (Dwelling Area) LED replacing R-BR Basecase Total Watts = 4.13 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	11 to <14 Watts R-BR Lamp LED replacing R-BR Basecase Total Watts = 4.13 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	11 to <14 Watts R-BR lamp (Residential) LED replacing R-BR Basecase Total Watts = 4.13 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	12 Watt to < 13 Watt PAR30 (Common Area) LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	12 Watt to < 13 Watt PAR30 LED replacing PAR30 Basecase Total Watts = 2.94 x Msr Watts	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	12 Watt to < 13 Watt PAR30 LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	12 Watt to < 13 Watt PAR38 (Dwelling Area) LED replacing PAR38 Basecase Total Watts = 3.81 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	12 Watt to < 13 Watt PAR38 (Res) LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	12 Watt to < 13 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	12 Watt to < 13 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.81 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	13 Watt to < 14 Watt PAR30 LED replacing PAR30 Basecase Total Watts = 2.94 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	13 Watt to < 14 Watt PAR30 LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	13 Watt to < 14 Watt PAR38 (Res) LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	13 Watt to < 14 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	14 Watt to < 15 Watt PAR30 (Common Area) LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	14 Watt to < 15 Watt PAR30 (Dwelling Area) LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	14 Watt to < 15 Watt PAR30 LED replacing PAR30 Basecase Total Watts = 2.94 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	14 Watt to < 15 Watt PAR30 LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	14 Watt to < 15 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	14 Watt to < 15 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.81 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	14 to =22 Watts R-BR Lamp (Common Area) LED replacing R-BR Basecase Total Watts = 3.73 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	14 to =22 Watts R-BR Lamp (Dwelling Area) LED replacing R-BR Basecase Total Watts = 3.73 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	14 to =22 Watts R-BR Lamp LED replacing R-BR Basecase Total Watts = 3.73 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	14 to =22 Watts R-BR lamp (Residential) LED replacing R-BR Basecase Total Watts = 3.73 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	15 Watt to < 16 Watt PAR30 (Common Area) LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	15 Watt to < 16 Watt PAR38 (Common Area) LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	15 Watt to < 16 Watt PAR38 (Res) LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	15 Watt to < 16 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	15 Watt to < 16 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.81 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	16 Watt to < 17 Watt PAR38 (Common Area) LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	16 Watt to < 17 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	16 Watt to < 17 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.81 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	17 Watt to < 18 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	17 Watt to < 18 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.81 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	18 Watt to < 19 Watt PAR38 (Common Area) LED replacing PAR38 Basecase Total Watts = 3.81 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	18 Watt to < 19 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	19 Watt to < 20 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	19 Watt to < 20 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.81 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	20 Watt to < 21 Watt PAR38 (Common Area) LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	20 Watt to < 21 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	26 Watt to < 27 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	6 Watt to < 7 Watt MR16 (Common Area) LED replacing MR16 Basecase Total Watts = 4.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	6 Watt to < 7 Watt MR16 LED replacing MR16 Basecase Total Watts = 4.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	6 Watt to < 7 Watt PAR16 LED replacing PAR16 Basecase Total Watts = 4.04 x Msr Watts	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	7 Watt to < 8 Watt MR16 (Common Area) LED replacing MR16 Basecase Total Watts = 4.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	7 Watt to < 8 Watt MR16 (Dwelling Area) LED replacing MR16 Basecase Total Watts = 4.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	7 Watt to < 8 Watt MR16 LED replacing MR16 Basecase Total Watts = 4.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	7 Watt to < 8 Watt PAR20 LED replacing PAR20 Basecase Total Watts = 4.7 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	8 Watt to < 9 Watt MR16 LED replacing MR16 Basecase Total Watts = 4.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	8 Watt to < 9 Watt PAR20 LED replacing PAR20 Basecase Total Watts = 4.7 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	9 Watt to < 10 Watt MR16 LED replacing MR16 Basecase Total Watts = 4.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	9 Watt to < 10 Watt PAR20 (Dwelling Area) LED replacing PAR20 Basecase Total Watts = 4.7 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	9 Watt to < 10 Watt PAR20 LED replacing PAR20 Basecase Total Watts = 4.7 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	< 10 Watt PAR30 (Common Area) LED replacing PAR30 Basecase Total Watts = 2.94 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	< 10 Watt PAR30 (Common Area) LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	< 10 Watt PAR30 (Dwelling Area) LED replacing PAR30 Basecase Total Watts = 2.94 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	< 10 Watt PAR30 (Dwelling Area) LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	< 10 Watt PAR30 LED replacing PAR30 Basecase Total Watts = 2.94 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	< 10 Watt PAR30 LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	< 12 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.81 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	< 6 Watt MR16 LED replacing MR16 Basecase Total Watts = 4.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	< 6 Watt PAR16 LED replacing PAR16 Basecase Total Watts = 4.04 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	<11 Watts R-BR Lamp (Common Area) LED replacing R-BR Basecase Total Watts = 5.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	<11 Watts R-BR Lamp (Dwelling Area) LED replacing R-BR Basecase Total Watts = 5.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	<11 Watts R-BR Lamp LED replacing R-BR Basecase Total Watts = 5.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	<11 Watts R-BR lamp (Residential) LED replacing R-BR Basecase Total Watts = 5.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	= 11 Watts PAR20 (Res) LED replacing PAR20 Basecase Total Watts = 4.04 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	= 11 Watts PAR20 LED replacing PAR20 Basecase Total Watts = 4.04 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	= 27 Watts PAR38 LED replacing PAR38 Basecase Total Watts = 3.28 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	= 7 Watts PAR16 LED replacing PAR16 Basecase Total Watts = 4.04 x Msr Watts	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	> 15 to 21 Watt PAR30 LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	> 17 to 25 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.81 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	> 6 to 10 Watt MR16 LED replacing MR16 Basecase Total Watts = 4.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	> 8 to 12 Watt PAR20 LED replacing PAR20 Basecase Total Watts = 4.7 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	>= 10 Watt PAR20 (Common Area) LED replacing PAR20 Basecase Total Watts = 4.7 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	>= 10 Watt PAR20 (Dwelling Area) LED replacing PAR20 Basecase Total Watts = 4.7 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	>= 10 Watt PAR20 LED replacing PAR20 Basecase Total Watts = 4.7 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: MR16 11 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: MR16 3 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: MR16 6 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR20 10 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR20 6 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR20 7 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR	LED Lamp: PAR20 9 Watts non-dimmable	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
	LAMP		
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR30 10 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR30 11 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR30 12 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR30 14 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR30 15 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR30 6 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR30 8 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR38 12 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR38 13 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR38 15 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR38 16 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR38 17 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	LED Lamp: PAR38 19 Watts non-dimmable	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR	LED Lamp: PAR38 7 Watts non-dimmable	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
	LAMP		
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	Up to 15 Watt Exterior PAR30 (Dwelling Area) LED replacing PAR30 Basecase Total Watts = 2.94 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	Up to 15 Watt PAR30 LED replacing PAR30 Basecase Total Watts = 3.42 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	Up to 17 Watt PAR38 LED replacing PAR38 Basecase Total Watts = 3.81 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING INDOOR LED REFLECTOR LAMP	Up to 6 Watt MR16 LED replacing MR16 Basecase Total Watts = 4.24 x Msr Watts	LED_REFLECTOR
SCE	LIGHTING OUTDOOR LED FIXTURE	114 to 123 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 250 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	114 to 123 Watt Exterior LED Fixture mounted 15 to <24 ft. with Motion Control and Photo Sensor LED replacing 250 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	121 to 150 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 250 Watt High Pressure Sodium	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	124 to 161 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 320 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	124 to 161 Watt Exterior LED Fixture mounted 15 to <24 ft. with Motion Control and Photo Sensor LED replacing 320 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	151 to 203 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 310 Watt High Pressure Sodium	LED_OUTDOOR_FIXTURE

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING OUTDOOR LED FIXTURE	162 to 194 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 350 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	162 to 194 Watt Exterior LED Fixture mounted 15 to <24 ft. with Motion Control and Photo Sensor LED replacing 350 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	195 to 226 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 400 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	195 to 226 Watt Exterior LED Fixture mounted 15 to <24 ft. with Motion Control and Photo Sensor LED replacing 400 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	204 to 275 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 400 Watt High Pressure Sodium	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	227 to 254 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 450 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	227 to 254 Watt Exterior LED Fixture mounted 15 to <24 ft. with Motion Control and Photo Sensor LED replacing 450 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	255 to 325 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 575 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	255 to 325 Watt Exterior LED Fixture mounted 15 to <24 ft. with Motion Control and Photo Sensor LED replacing 575 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING OUTDOOR LED FIXTURE	326 to 440 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 750 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	326 to 440 Watt Exterior LED Fixture mounted 15 to <24 ft. with Motion Control and Photo Sensor LED replacing 750 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	41 to 80 Watt Wall Pack LED replacing 176 to 250 Watt High Pressure Sodium	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	45 to 67 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 150 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	45 to 67 Watt Exterior LED Fixture mounted 15 to <24 ft. with Motion Control and Photo Sensor LED replacing 150 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	50 to 90 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 150 Watt High Pressure Sodium	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	518 to 643 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 1000 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	68 to 90 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 175 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	68 to 90 Watt Exterior LED Fixture mounted 15 to <24 ft. with Motion Control and Photo Sensor LED replacing 175 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	91 to 113 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 200 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE

PA	Measure Group	Measure Name	ESPI Measure
SCE	LIGHTING OUTDOOR LED FIXTURE	91 to 113 Watt Exterior LED Fixture mounted 15 to <24 ft. with Motion Control and Photo Sensor LED replacing 200 Watt Pulse Start Metal Halide	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	91 to 120 Watt Exterior Fixture with Motion Control and Photo Sensor LED replacing 200 Watt High Pressure Sodium	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	Exterior LED Fixture mounted less than 15 ft. above finished grade	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	Exterior LED fixture replacements (utilizing approved luminaries)	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	Exterior LED outdoor pole/arm-mounted decorative luminaires	LED_OUTDOOR_FIXTURE
SCE	LIGHTING OUTDOOR LED FIXTURE	Exterior LED wall-mounted area luminaires	LED_OUTDOOR_FIXTURE
SDG&E	LIGHTING INDOOR LED FIXTURE	Commercial LED Recessed Downlight 21 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	Commercial-LED Recessed Downlight 12 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	Commercial-LED Recessed Downlight 13 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	Commercial-LED Recessed Downlight 14 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	Commercial-LED Recessed Downlight 15 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	Commercial-LED Recessed Downlight 16 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	Commercial-LED Recessed Downlight/Retrofit 10 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	Commercial-LED Recessed Downlight/Retrofit 11 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	Commercial-LED Recessed Downlight/Retrofit 15 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	Commercial-LED Recessed Downlight/Retrofit 9 Watt	LED_DOWNLIGHT

PA	Measure Group	Measure Name	ESPI Measure
SDG&E	LIGHTING INDOOR LED FIXTURE	High Bay LED: 40 to 131 watts	LED_HIGHBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	High Bay LED: >131 to 160 watts	LED_HIGHBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	High Bay LED: >160 to 187 watts	LED_HIGHBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	High Bay LED: >187 to 220 watts	LED_HIGHBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	High Bay LED: >220 to 262 watts	LED_HIGHBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	High Bay LED: >262 to 280 watts	LED_HIGHBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	High Bay LED: >280 to 320 watts	LED_HIGHBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	High Bay LED: >320 to 500 watts	LED_HIGHBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Ambient Commercial Fixtures, Size 1x4, 3000-3300 lumens	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Ambient Commercial Fixtures, Size 1x4, 3601-3999 lumens	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Ambient Commercial Fixtures, Size 2x2, 3000-3300 lumens	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Ambient Commercial Fixtures, Size 2x2, 3301-3600 lumens	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Ambient Commercial Fixtures, Size 2x2, 3601-3999 lumens	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Ambient Commercial Fixtures, Size 2x2, 4000-4300 lumens	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Ambient Commercial Fixtures, Size 2x2, 4301-4600 lumens	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Ambient Commercial Fixtures, Size 2x4, 4000-4300 lumens	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Ambient Commercial Fixtures, Size 2x4, 4301-4600 lumens	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Ambient Commercial Fixtures, Size 2x4, 4601-4999 lumens	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Fixture: 22 to 39 watts	LED_LOWBAY

PA	Measure Group	Measure Name	ESPI Measure
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Fixture: 40 to 131 watts	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Fixture: >131 to 160 watts	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Recessed Downlight 10 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Recessed Downlight 11 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Recessed Downlight 12 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Recessed Downlight 13 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Recessed Downlight 14 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Recessed Downlight 15 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Recessed Downlight 16 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Recessed Downlight 21 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Recessed Downlight/Retrofit 9 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 11 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 12 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 13 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 14 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 15 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 16 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 17 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 18 Watt	LED_DOWNLIGHT

PA	Measure Group	Measure Name	ESPI Measure
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 19 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 20 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 21 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 22 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 23 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 24 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 25 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 5 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED Surface, Pendant, Track, Accent, and Recessed Downlight 8 Watt	LED_DOWNLIGHT
SDG&E	LIGHTING INDOOR LED FIXTURE	LED T8 Lamp_Direct Install	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	LED T8 Lamp_PreRebUp_Mid-Stream	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED FIXTURE	Lighting - Linear LED Systems (Bi-pin Halogen Basecase)	LED_LOWBAY
SDG&E	LIGHTING INDOOR LED LAMP	(Res) LED A-Lamp 1050-1489 Lumen, 75w EISA, LPW = 90, CompScore = 282, dWP = 12.6	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	(Res) LED A-Lamp 1490-2600 Lumen, 100w EISA, LPW = 100, CompScore = 282, dWP = 19.1	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	(Res) LED A-Lamp 1490-2600 Lumen, 100w EISA, LPW = 90, CompScore = 282, dWP = 17.2	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	(Res) LED A-Lamp 750-1049 Lumen, 60w EISA, LPW = 80, CompScore = 282, dWP = 7.8	LED_A-LAMP

PA	Measure Group	Measure Name	ESPI Measure
SDG&E	LIGHTING INDOOR LED LAMP	(Res-DI) LED A-Lamp 1050-1489 Lumen, 75w EISA, LPW = 90, CompScore = 282, dWP = 12.6	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	(Res-DI-InCmn) LED A-Lamp 1050-1489 Lumen, 75w EISA, LPW = 90, CompScore = 282, dWP = 12.6	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	(Res-DI-OutCmn) LED A-Lamp 1050-1489 Lumen, 75w EISA, LPW = 90, CompScore = 282, dWP = 12.6	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	Commercial-LED - Candalebra 2 Watt	LED_ACCENT
SDG&E	LIGHTING INDOOR LED LAMP	Commercial-LED - Candalebra 5 Watt	LED_ACCENT
SDG&E	LIGHTING INDOOR LED LAMP	Commercial-LED Screw-in A-Lamp 10 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	Commercial-LED Screw-in A-Lamp 12 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	Commercial-LED Screw-in A-Lamp 15 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	Commercial-LED Screw-in A-Lamp 17 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	Commercial-LED Screw-in A-Lamp 7 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	Commercial-LED Screw-in A-Lamp 8.5 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	Commercial-LED Screw-in A-Lamp 9 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	Commercial-LED Screw-in A-Lamp 9.5 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED - (DI) A -lamp 1490-2600 Lumens, 100w EISA, LPW=100, CompScore=282, dWP=19.1	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED - Candalebra 3.5 Watt	LED_ACCENT
SDG&E	LIGHTING INDOOR LED LAMP	LED - Candalebra 4 Watt	LED_ACCENT
SDG&E	LIGHTING INDOOR LED LAMP	LED - Candalebra 5 Watt	LED_ACCENT

PA	Measure Group	Measure Name	ESPI Measure
SDG&E	LIGHTING INDOOR LED LAMP	LED - Mid-Strm(non-res) A -lamp 1490-2600 Lumens, 100w EISA, LPW=100, CompScore=282, dWP=19.1	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 10 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 11 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 12 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 13 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 13 Watt - Dwelling Unit	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 13 Watt - Residential Indoor Common Area Lighting	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 13 Watt - Residential Outdoor Common Area Lighting	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 15 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 16 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 17 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 7 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 8 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 8.5 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 9 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in A-Lamp 9.5 Watt	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in Globe 7.5 Watt	LED_ACCENT

PA	Measure Group	Measure Name	ESPI Measure
SDG&E	LIGHTING INDOOR LED LAMP	LED Screw-in Globe 8 Watt	LED_ACCENT
SDG&E	LIGHTING INDOOR LED LAMP	LED- (DI) A -lamp 1050-1489 Lms, 75w EISA, LPW=100, CompScore=282, dWP=13.5	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED- (DI) A-lamp 750-1049 Lms, 60w EISA, LPW=90, CompScore=282, dWP=9.2	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED- (Mid-Stream) A -lamp 1050-1489 Lms, 75w EISA, LPW=100, CompScore=282, dWP=13.5	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED- Mid-Stream (non-res) A -lamp 1490-2600 Lumens, 100w EISA, LPW=90, CompScore=282, dWP=17.2	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED- Mid-Stream(Non-Res) A -lamp 1050-1489 Lms, 75w EISA, LPW=90, CompScore=282, dWP=12.6	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED LAMP	LED-Mid-Stream (Non-Res) A -lamp 750-1049 Lumens, 60w EISA, LPW=80, CompScore=282, dWP=7.8	LED_A-LAMP
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED - MR16 7 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED - RefR 9 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in BR30 8 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in PAR20 7 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in PAR20 8 watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in PAR30 11 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in PAR30 12 Watt	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in PAR30 13 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in PAR30 8 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in PAR38 11 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in PAR38 17 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in PAR38 18 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in R30 11 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in R30 12 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in R30 13 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in R40 11 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in R40 14 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in R40 15 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	Commercial-LED Screw-in R40 16 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED - MR16 10 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED - MR16 4 Watt	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED - MR16 6 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED - MR16 7 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED - MR16 8 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED - RefR 9 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in BR30 8 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in MR16 7 Watt - Interior Common Area	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR20 7 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR20 8 watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR30 11 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR30 12 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR30 12 Watt - Interior Dwelling Units	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR30 13 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR30 14 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR30 8 Watt	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR38 11 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR38 13 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR38 14 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR38 16 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR38 17 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR38 18 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in PAR38 19 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in R30 11 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in R30 12 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in R30 13 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in R40 10 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in R40 11 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in R40 12 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in R40 14 Watt	LED_REFLECTOR

PA	Measure Group	Measure Name	ESPI Measure
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in R40 15 Watt	LED_REFLECTOR
SDG&E	LIGHTING INDOOR LED REFLECTOR LAMP	LED Screw-in R40 16 Watt	LED_REFLECTOR
SDG&E	LIGHTING OUTDOOR LED FIXTURE	Lighting - Exterior LED Fixtures <=110 watts	LED_OUTDOOR_FIXTURE
SDG&E	LIGHTING OUTDOOR LED FIXTURE	Lighting - Exterior LED Fixtures <=130 watts	LED_OUTDOOR_FIXTURE
SDG&E	LIGHTING OUTDOOR LED FIXTURE	Lighting - Exterior LED Fixtures <=192watts	LED_OUTDOOR_FIXTURE
SDG&E	LIGHTING OUTDOOR LED FIXTURE	Lighting - Exterior LED Fixtures <=80 watts	LED_OUTDOOR_FIXTURE

APPENDIX F RESPONSE TO COMMENTS

Appendix F
2017 Nonresidential ESPI Deemed Lighting Impact Evaluation
Response to Comments

Comment #	Section	Topic	Page	Comment	Evaluator Response
1	Overarching	Executive Summary	1	The report is missing the Executive Summary: The report does not include an Executive Summary, which is a critical part of the report. When will stakeholders be provided a complete draft for review, including executive summary, before the final report is published?	Please find the Executive Summary in the final report.
2	6/1/2003	Changes to NTG algorithm	4-Jun	Omitting PA-1 from the NTG scoring algorithm may have compromised the accuracy of the NTG results: The NTG scoring algorithm was changed from past evaluations to exclude PAI-1. A working group developed the three PAIs in a consensus-based process. We are concerned that removing the PAI-1 may have jeopardized the accuracy of the NTG results. In summary, the evaluators gave three reasons the PAI-1 value was disregarded: • It scores with somewhat little variation in the value • PAI-1 and PAI-2 are considered “very similar” • PAI-1 is considered to not track “no program” behavior well We believe the first reason does not seem valid for disregarding the value, since little fluctuation doesn't indicate inaccuracy or irrelevancy. Similarly, the second reason doesn't seem valid since similar results between indices also does not indicate inaccuracy or irrelevancy. The third reason may have merit. However, even the low values for PAI-1 for PG&E appears to be about the same or higher than PAI-2 and PAI-3 for PG&E. In short, we believe the NTG may be underestimated because PAI-1 was removed. Can the evaluators please show in the final report how the results may have changed if PAI-1 were included, and discuss in the final report whether re- incorporating PAI-1 is an option here or in future Nonresidential ESPI Deemed Lighting Impact Evaluations? This will help to validate whether the NTG methodology changes are warranted and providing accurate information. Can Itron please include this additional detail in the final report for greater understanding and transparency?	We do not believe omitting PAI-1 compromises the accuracy of the NTG results. In fact, we believe the opposite, that including PAI-1 may be biasing the NTGR towards a value closer to 0.5. We have revised Section 6 and focused on 2 reasons for removal of PAI-1 - the lack of correlation with free ridership, and the bias it creates by incorporating it into the score. As requested, we have shown the NTGRs with and without PAI-1. For PY2018, we do plan to revisit the NTG methodology. However, we feel it is unlikely that PAI-1 will be re-incorporated for the reasons stated above and in the report.
3	6-2	Table 6-2	6-5	We request additional investigation and explanation of why the ex post NTG values are different by PA: The NTG values calculated show a differentiation of values for PG&E compared to SCE and SDG&E. While the Ex Ante values are lower, the difference is not considerably lower, but the difference in the value for the Ex Post values is considerable. Itron indicates that the reasons for this are not clear. Could Itron please explore to try to understand if this is an issue of systemic bias in the survey tool or if there is another reason that the deviation is occurring, and then discuss this in the final report?	We have revised the report to provide additional investigation on why the NTGRs are lower for PG&E. Essentially, we see that the PG&E participants were much more likely to have already made their decision to install the new equipment prior to becoming aware of the program rebate. Furthermore, significantly more PG&E participants reported they would have done the same thing in the absence of the program. Also, by comparing the main business type and facility size of the participants (see Appendix D Questions CC2A and FM050), we see a significant difference in the building type distribution for PG&E and larger facility size. Historically, we have seen higher rates of free ridership for some of these types of customer segments.
4	N/A	N/A	N/A	Was PG&E’s LED Midstream Program lamps incentive program included as part of this evaluation? If not, which CPUC impact evaluation would these measures be evaluated?	PG&E's LED midstream Program lamp incentive program was included as part of the evaluation. The evaluation team did NOT conduct any new primary net research on lamp or downlight measures, so ex ante NTGs from both midstream and downstream programs were passed through. The evaluation team did conduct primary gross research on both midstream and downstream lamps and downlights and updated gross savings for all these measures. We will conduct NTG research on these lamp/downlight measures for PY2018 (See page 4-3).

Comment #	Section	Topic	Page	Comment	Evaluator Response
5	2-1	Table 2-1	2-2	The report states, "As evident above, LED fixture measures represent a significant proportion of portfolio level lifecycle savings at the statewide level (Table 2-2 also provides that proportion for each PA)", but it ultimately measures out to about 9% of the statewide portfolio for all four measures. Could Itron please clarify?	Thanks for the comment. Of the total 9% of ex ante lifecycle savings for nonresidential, deemed, non-upstream measure claims in the PY2017 portfolio, Indoor LED fixtures make up 4% of the total portfolio or roughly 45.7% of the measures subject to evaluation as detailed in Table 2-2.
6	3-2-2	Figure 3-1	3-9	Can Itron please clarify in the report what is the hierarchy of device controls assignment for products that are on multiple controls? Switches dominate this list, but the code required switched lighting, so presumably, almost all of the lights were switched. Also, can Itron please clarify in the report if Figure 3-1 indicates those that were both switched and also had an additional control method (with the exception of the "electric panel" item, which I presume means no switching at all)?	The heirarchy of device control is not based on the control itself, but the customer self-reported schedule of the lighting system. If all measures were controlled by an EMS and the site contact provided our auditors the schedule for all those measures, then EMS would signify the control method. If half those measures were controlled by an EMS and that schedule differed from the other half of installations installed on a switch, then 2 schedules were created. (SEE page B-14 in Appendix B).
7	4-2	Table 4-1 & Table 4-3	4-2 & 4-5	It appears that the N values are not logically totaled in this Table because of the overlap. It implies something different from what is actually being counted. Perhaps remove the "All" N-count for each utility?	The totals in these 2 tables are purposely different. Table 4-1 presents the total savings (and count of unique sites) that are downstream or midstream. Our phone survey sample was designed around downstream only (e.g., midstream measures were passed through) so Table 4-3 presents the total number of downstream sites and associated savings only in our sample frame.
8	5-1	First Year Impact	5-2	The stated formula appears to disregard any change in full use equivalent hours of operation during the year that may be a result of controls additions/changes. Is this a correct interpretation? If so, is this an accurate presentation of hours of operation?	The annual hours of use (HOU) were developed by building type and technology type (e.g., LED A-lamps installed in a hotel versus downlights installed in a hotel). The HOU take into account the distribution of schedules and device controls found at the time of the verification of measure installation in 2013-2015. Given we do not know that distribution of schedules and device controls in PY2017 (or the activity area of installation by building type) we relied on the distribution found from on-site work conducted in 2013-2015. No additional modifications were made beyond that. Further, we are examining the savings associated with the lamps or fixtures, not with the control. If a control has been installed prior to the retrofit or at the same time, then the savings associated with the retrofit should reflect the HOU associated with the controls.
9	5-2-1	Table 5-2	5-6	Table 5-2 appears to state that removal and storage are mutually exclusive, but isn't it also likely that removal might indicate failure (without a sufficient replacement), and won't removal likely also overlap on storage to some level? How is that accounted for?	Removal and storage rates may not be mutually exclusive. The on-site auditor works with each site contact to identify how many rebated measures were installed and operable, and if the count is less, they try and ascertain why. Pages B-23 and B-24 of Appendix B provide how the "observed vs rebated" number of measures installed is developed for each site-measure.
10	5-2-2	Tables 5-4 through 5-7	5-11	The "All Building Types" total at the bottom appears to represent an average of the annual operating hours. However, is this weighted based on sites, fixtures, wattage or a combination of these items?	The all building type category was developed as the weighted average of building types and was presented both for presentation purposes and to provide precision estimates around the entire sample of measures. The weight is a fixture weight. This average was NOT used to update HOU for any PY2017 claims.

Comment #	Section	Topic	Page	Comment	Evaluator Response
11	5-2-2	"…were verified more substantially…"	5-13	Can Itron please clarify in the report what is meant by, "more substantially verified"? Does it mean that the evaluators verified a higher percentage of the product installed, possibly that there are more of these installed, so more were verified, or does it mean that of those verified, a higher percentage were found to be present, or something else?	This just means - of the rebated and installed measures found on site, our surveyors confirmed a greater distribution of installations for a given technology type in one activity area relative to another technology type (See Table 3-4 in Section 3). 92% of program rebated A-lamps were found installed in guest rooms while 40% of downlight measures were found installed in hallways/lobbies.
12	5-2-2	Figure 5-5	5-15	The MR-16 graph appears to show a symptom of lamp binning that is somewhat expected as LEDs advance in efficacy. It appears to show a wattage bin product from 2014 that has dropped down a wattage bin in one year's time (from 14-17 watts to 11-13 watts). Presumably, these bins aren't arbitrary, and the tables of these wattage bins are obfuscating the annual comparisons of performance as some products that would have previously been in a high bin drop down to a lower bin, and so are no longer in the same comparison columns. Can Itron please clarify in the report if these comparisons should be done by lumen binning instead of wattage binning to make the differences clearer? If so, could Itron update the report accordingly?	The way our analysis was performed, it was necessary to bin the lamps by wattage so we could determine how increases in efficacy would have resulted in different (likely lower) wattages in 2017 compared to the wattage values we found in 2014-15. We would also like to point out that based on the relatively small sample sizes for the MR-16 lamps, particularly in the higher wattage bins, we cannot really draw any statistically significant conclusions about patterns over a one year period.
13	5-2-2	Figure 5-6 and text	5-16	Figure 5-6 indicates that no LED products were found as baseline technologies, and further, no incandescent lamps were found as well. Is it likely that several years later, there will be no LED products found? Further, the text discusses that the team looked in storage rooms for existing lamps, but how likely is it that the lamps in there are relics from a long time ago, and don't represent a reasonable baseline for just prior to the retrofit? For example, when the field team looked, were incandescent A-lamps disregarded as being unlikely baseline technology, or were they given the same evidentiary weight as other more recent lamps?	Our onsite auditors work with the site contact to determine if what was in storage was what was removed. As to what to expect in several years, it is difficult to say what may be found. We actually might expect to see more efficient LEDs replacing older LEDs that had poorer efficacy (ie., more watts per lumen).
14	5-2-2	Figure 5-8	5-17	How reasonable are the lumen bins that were employed in the graphs (taken from EISA 2007) based on the output of the variety of lamps that are available during the evaluation period? Since approximately ten years have passed and the light source technology has advance considerably, the binning that was employed in 2007 may have bias in the results if the majority of the products in the bin are not centered in the range, and especially if the majority of LED products and baseline technology products do not align to produce equal output equivalencies, especially at the boundaries of the bins.	The evaluation team reviewed the distribution of light output for each LED measure as well as the rated lumens for halogen and general service incandescent halogens on the market. For example, the baseline wattage for an LED A-lamp replacing a 43 watt halogen incandescent lamp was based on a lumen bin of 750-1,049 lumens. The mean lumens was 812 and the median was 800 lumens, based on a sample of 301 LED A-Lamp site-measures. While lower in the bin, 800 lumen LED products represented over 1/2 of all measures in that bin. This equates to a 60W equivalent incandescent or a 43 watt incandescent halogen baseline.
15	5-2-2	Figure 5-10	5-18	There appears to be a bias in the evaluation method that is disfavoring the higher efficacy results. Is this a result of the binning? If not, can Itron please explain in the report what is the reason for the bias?	We don't consider this bias. There is no issue with binning in this exhibit as each of the observations on the graphs represent an individual site-measure, so no binning or aggregation was conducted. Further, we wouldn't expect a measure that was already very efficient (e.g., a 100 lumen/watt technology found on-site in 2015) to become much more efficient in 2017. The expectation is that lower efficiency equipment (e.g., a 55 lumen/watt technology found on-site in 2015) to be more efficient in 2017, where the average lumens per watt is closer to 80 or 90 LPW.

Comment #	Section	Topic	Page	Comment	Evaluator Response
16	6-2	Comments on PG&E results of NTG calculations	6-6	The report comments that the PAI-3 results are not favorable for PG&E. Considering how poorly the PAI-3 values were and that the weighting of the PAI-3 value has increased to 50% of the scoring, should the phone interview questions be evaluated carefully? There may be an inherent problem with the survey conflating customer awareness or sensitivity of issues with the actual decision-making process that results in an energy efficiency project taking place.	We do not believe there is an issue with this survey question. The relatively low PAI-3 score is validated by the relatively low PAI-2 score, as well as other survey question responses (N2 and N6) as discussed in the revised write-up of Section 6.
16	7-0	Table 7-1	7-1	Table 7-1 shows that the "LED Lamp - A-lamps" NTG value is a Pass-Through from the previous evaluation cycle. Since this appears to be the category with the highest NTG reduction value for PG&E (both in percentage, and in total Gross savings), the re-evaluation of the NTG values warrant considerable attention. Are the evaluators certain that there haven't been any systematic changes that have been made by the utility to improve the NTG value? We believe the impact of that low NTG value is great enough to warrant further attention in this evaluation and future evaluations.	Pass-Through means that ex-ante values are passed through, not that previous evaluaton results were used. Therefore, the NTGR has no effect on the realization rates. We do, however, plan to evaluate the NTGR for these measures in PY2018.
18	8-0	Recommendation 1	8-1	A metering study may not be necessary with buildings that have an ALCS or similar lighting control system. It is possible with many/most of these to 'report' out use summaries for periods of time? Most of them are capable of measuring and/or calculating power draw and energy consumption with good accuracy, although some may not fully employ meter-grade monitoring. The errors presented by the reports may still be smaller than observation and reporting, especially when considering a dynamic lighting system.	Agreed. The points you make in your comment are precisely why we utilized the term "monitoring" versus "metering" in the recommendation.
19	8-0	Recommendation 3	8-2	The retrofit of an HIG source with an LED source is often not an issue of lamp efficacy by luminaire efficacy. This complicates the calculations considerably and should be considered much more carefully in the evaluation of any product that is intended to replace HID light sources. Can Itron please provide thoughts on this?	Thanks for the comment. This finding and recommendation was based on phone survey data only. Our team plans to conduct field work on these measures for PY2018. These types of research questions are helpful in developing scope for those evaluations.
20	8-0	Recommendation 4	8-2	This may be the most important finding and recommendation in this report. There is some evidence that the previously-held presumption that a lighting system that is 15 years old is at end of life may not be true in a practical sense, and especially as budgets for renovation have tightened, the approach to extend the life of the existing system increases. A study as recommended will likely be very informative and the value is crucial to the free ridership questions that invariably occur.	Thanks for the comment.
21	Appendix C	Table 1 & 2	C-6	Could Itron please provide an explanation of the formulas used to derive the "All" rollup value for each building type? Is it weighted based on wattage, number of sites, a combination of both?	See response to Comment 12 above.
22	Appendix C	Hours of use analysis notes	C-8	Do the self-report questions provide the possibility to report both the "operating hours" and the "occupied hours" so that a reasonable estimate of the length of shoulders for retail and restaurants can be estimated more reasonably?	The self-report questions aim to reveal the occupied hours and the operating hours. The vast majority of site contacts do not self-report "occupied hours" throughout shoulder periods. Given the small sample of projects that do provide this information, the usage rate, based on the actual % ON from the logger sample relative to the business hours, is found to be a more reliable proxy.

Comment #	Section	Topic	Page	Comment	Evaluator Response
23	Appendix D	Question AA3	D-12	Question AA-3 appears to have a large disparity between the rates of responses that answered "To get a rebate from the program" across the utilities. Is there an explanation for why this occurred? The differences are stark and seem to indicate a potential problem with the wording, with the survey respondent pool, or some other potential discrepancy.	Thanks for your attention to this. We have updated this appendix since the draft report to reflect the final responses from the phone survey. Please note that Question AA-3 is an open ended question, and respondents are not prompted for a categorized response. The phone interviewer captures all the answers provided by the customer, so any given customer could give multiple responses. Our team can't speculate given the unprompted, open nature of the question and answer.