Public Utility Commission of Texas

Volume 2. Utility-Specific Energy Efficiency Portfolio Report Program Year 2019

TETRA TECH

TEXAS ENERGY ENGINEERING SERVICES, INC. (www.teesi.com)

September, 2020

700 N. St. Mary's St., Suite 330, San Antonio, TX 78205
Tel 210-299-7900 | Fax 210-226-8497

tetratech.com

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

GLOSSARY: ACRONYMS/ABBREVIATIONS/DEFINITIONS

Acronym	Description
AC	Air conditioner
AEP TCC	American Electric Power Texas Central Division
AEP TNC	American Electric Power Texas North Division
CF	Coincidence factor
C&I	Commercial and industrial
CMTP	Commercial Market Transformation Program
CNP	CenterPoint Energy Houston Electric, LLC
CSOP	Commercial Standard Offer Program
DHP	Ductless heat pump
DI	Direct Install
ECM	Energy conservation measure
EECRF	Energy Efficiency Cost Recovery Factor
EEIP	Energy Efficiency Implementation Project
EEPR	Energy Efficiency Plan and Report
EESP	Energy efficiency service provider
EISA	Energy Independence and Security Act of 2007
EM&V	Evaluation, measurement, and verification
Entergy	Entergy Texas, Inc.
EPE	El Paso Electric Company
ER	Early replacement
ERCOT	Electric Reliability Council of Texas
ERS	Emergency Response Service
ESCO	Energy service company
ESIID	Electric Service Identifier ID
ESNH	ENERGY STAR® New Homes
EUMMOT	Electric Utility Marketing Managers of Texas
GSHP	Ground-source heat pump
HCIF	Heating/cooling interactive factor
HOU	Hours of use
HPwES	Home Performance with ENERGY STAR®
HTR	Hard-to-reach
HVAC	Heating, ventilation, and air conditioning
IECC	International Energy Conservation Code
IPMVP	International Performance Measurement and Verification Protocol

Acronym	Description
kW	Kilowatt
kWh	Kilowatt hour
LED	Light emitting diode
LI	Low income
LI/HTR	Low income/hard-to-reach
LM	Load management
mcf	1,000 cubic feet
MF	Multifamily
MTP	Market transformation program
M&V	Measurement and verification
NTG	Net-to-gross
PUCT	Public Utility Commission of Texas
PV	Photovoltaics
PY	Program Year
QA/QC	Quality assurance/quality control
RCx	Retro-commissioning
RFP	Request for Proposal
RMTP	Residential Market Transformation Program
ROB	Replace-on-burnout
RSOP	Residential Standard Offer Program
SIR	Savings-to-investment ratio
SOP	Standard offer program
SRA	Self-report approach
SWEPCO	Southwestern Electric Power Company
TMY	Typical meteorological year
TEESI	Texas Energy Engineering Services, Inc.
TNMP	Texas-New Mexico Power Company
TRM	Technical reference manual
WACC	Weighted average cost of capital
Xcel Energy SPS	Southwestern Public Service Company (Subsidiary of Xcel Energy)

1.0 INTRODUCTION

This document presents the utility impact evaluation results from the third-party evaluation, measurement, and verification (EM&V) results for energy efficiency portfolios implemented in program year (PY) 2019. It is a companion document to Volume 1 of the Statewide Energy Efficiency Portfolio Report. A summary report, "2019 Energy Efficiency Accomplishments," is also available at www.puc.texas.gov.

PY2019 is the eighth program year evaluated as part of the statewide EM&V effort. The PY2019 scope is targeted impact evaluations for the savings areas of the highest uncertainty identified in the prior EM&V results or changes in programs or technologies. The targeted impact evaluations are concentrated on particular commercial and residential programs and end-uses. At the same time, a combination of interval meter data analysis and tracking system reviews provide a due diligence review of claimed savings for each utility portfolio.

The reviews provided an independent assessment of claimed savings and the accuracy of the program data. Documentation reviewed were tracking data, interval meter data, project files, energy savings calculations (including a review of input assumptions and algorithms to verify claimed program savings), and utilities' existing M&V information.

The PY2019 EM&V plans[1] are based on the prioritization for the EM&V effort. To briefly summarize, the EM&V team identified program types across utilities that have similar program design, delivery, and target markets. We reviewed each program type and prioritized (high, medium, low) based on the following considerations:

- magnitude of savings—the percentage of contribution to the portfolio of programs' impacts
- level of relative uncertainty in estimated savings
- level and quality of existing quality assurance/quality control (QA/QC) and verification data from on-site inspections completed by utilities or their contractors
- stage of the program or programmatic component (e.g., pilot, early implementation, mature)
- importance to future portfolio performance
- Public Utility Commission of Texas (PUCT) and Texas utilities' priorities
- prior EM&V results
- known and anticipated changes in the markets in which the programs operate

1.1 REPORT ORGANIZATION

Section 1.2 summarizes the evaluation approach. Sections 2 through 10 detail the EM&V results for each utility's portfolio.

This report contains several appendices. A visual representation of the EM&V database import, review, and validation process can be found in Appendix A. The calculations used for the program administrator cost test (PACT) (also known as the utility cost test) cost-effectiveness

[1] Public Utility Commission of Texas EM&V Plans for Texas Utilities' Energy Efficiency and Load Management Portfolios—Program Year 2019, June 2019.

methodology are in Appendix B. The EM&V team's quality assurance plan for the reported evaluated savings is in Appendix C.

Detailed desk review and on-site M&V are provided to utilities in separate documents.

1.2 EVALUATION APPROACH

This section discusses the PY2019 EM&V methodology. The foundation of the evaluation process was to create a statewide EM&V database with a streamlined data request process and a secure retrieval system. Complete PY2019 program data was requested from utilities and integrated into the database. A visual representation of the EM&V database import, review, and validation process can be found in Appendix A.

The EM&V database allowed the EM&V team to complete:

- due diligence reviews of claimed savings;
- program tracking system reviews; and
- efficient sampling across utilities and programs.

Next, the impact evaluation approach is summarized.

1.2.1 Implementing Impact Evaluations

The impact evaluations are used to calculate realization rates. The realization rate is determined by dividing the evaluated savings by the utility claimed savings. Utility-claimed savings are verified in the EM&V database from the tracking systems.

The EM&V team performed a tracking system review and a series of desk reviews for an initial assessment of the reasonableness of the claimed savings. Primary data were then collected for sampled projects to further assess the accuracy of the claimed savings.

Demand-side management (DSM) program evaluations routinely employ 90 percent confidence intervals with ±10 percent precision as the industry standard ("90/10"). A confidence interval is a range of values that is believed—with some stated level of confidence—to contain the true population quantity. The confidence level is the probability that the interval actually contains the target quantity. Precision provides a convenient shorthand for expressing the interval believed to contain the estimator; for example, if the estimate is 530 kWh, and the relative precision level is 10 percent, then the interval is 530 ±53 kWh.

In reporting estimates from a sample, it is essential to provide both the precision and its corresponding confidence level. In general, high levels of confidence can be achieved with wider intervals, while narrower, more precise intervals permit less confidence. In other words, when all else is held constant, there is a trade-off between precision and confidence. As a result, any statement of precision without a corresponding confidence level is incomplete and impossible to interpret. For example, assume the average savings among participants in an appliance program is estimated as 1,000 kWh per year, and it is determined this estimate has 16 percent relative precision at the 9 percent confidence level. The same dataset and the same formulas may be used to estimate 10 percent relative precision at the 70 percent confidence level. If the confidence level is not reported, the second formulation would appear to have less uncertainty, when in reality, the two are identical.

The estimators commonly used in DSM evaluations generally have sampling errors that are approximately normal in distribution. In Texas, EM&V activities were designed to achieve 90/10 confidence and relative precision for gross evaluated savings estimates at the utility portfolio level. This level was achieved via the sampling process used to select a random sample of commercial participants that received desk reviews, along with census reviews of residential deemed savings and load management savings.

1.2.1.1 Tracking System and Desk Reviews

For each residential program, the EM&V team reviewed the program tracking system and its linkage to any deemed savings tools or methods used to estimate savings at the measure and site level. Then for each medium or high priority program, the EM&V team reviewed a sample of applications entered into the utilities' tracking systems for accuracy and completeness.

Our review accomplished two primary objectives. First, it ensured that the measures installed are consistent with those listed in the tracking system. Second, the desk reviews verified that the savings estimates in the tracking system are consistent with the savings calculated in the deemed calculation tools, tables, or M&V methods used to estimate project savings.

The desk reviews included a review of the assumptions used for the savings assumptions and, when available, utility M&V reports gathered through the supplemental data request for sampled projects.

1.2.1.2 On-Site Measurement and Verification

For sampled projects across each utility portfolio, the EM&V team conducted on-site M&V. The on-site visits had two principal objectives: (1) verify the installation and operation of the equipment/systems, and (2) verify key assumptions made in calculating claimed savings estimates.

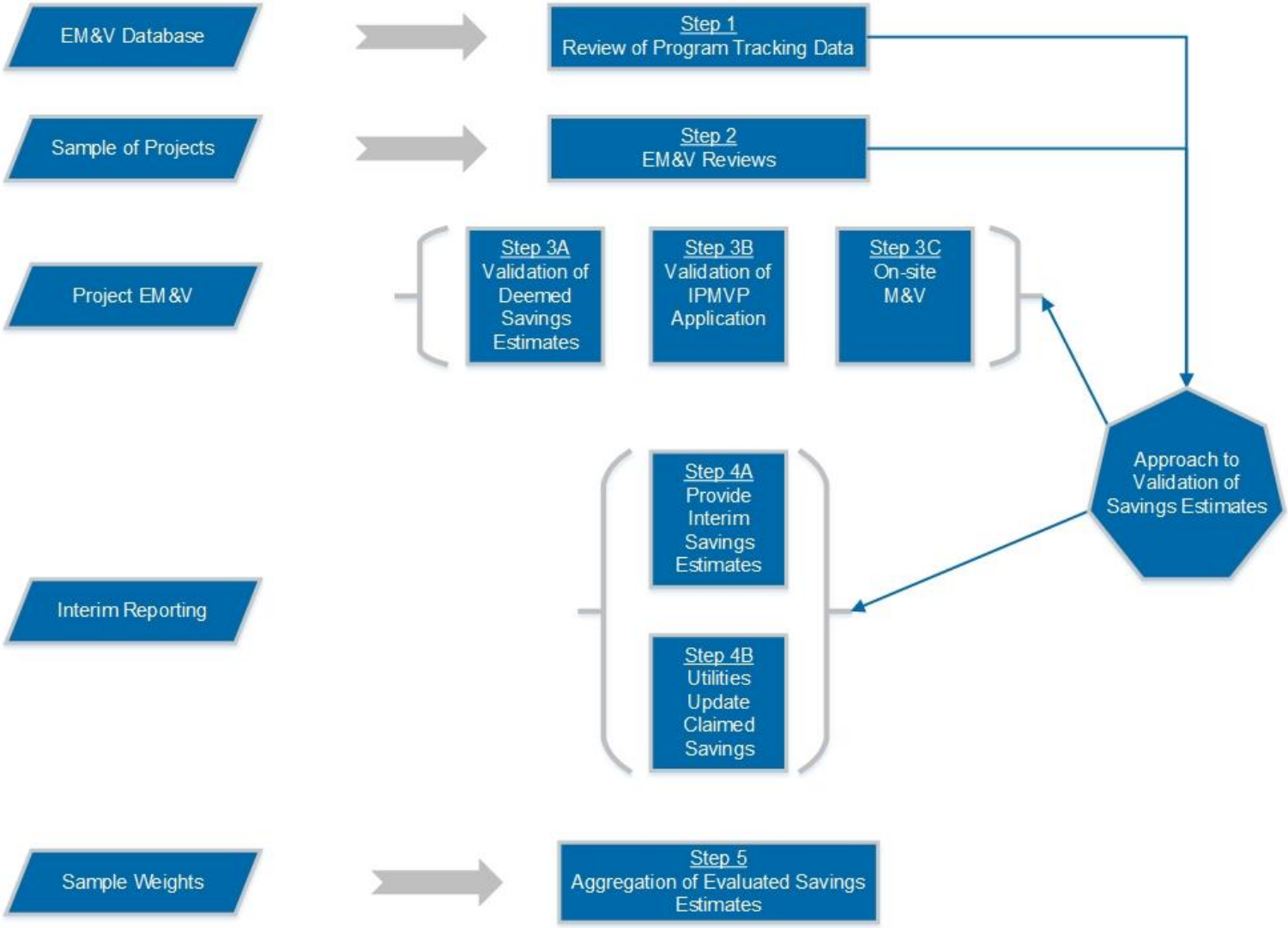
- Installations were verified via on-site data collection related to the number of measures installed and the location of the systems. Additionally, equipment nameplate information was documented, and a thorough visual inspection was completed in order to ensure the systems were working as intended. This was a basic inspection audit that took approximately one to two hours to complete.
- Site measurements, spot metering, or short-, and in some cases, long-term metering, were appropriated to develop an independent estimate of savings to compare to the utility's claimed savings estimates. This was a more comprehensive audit that sought to verify key input assumptions used to develop ex-ante claimed savings estimates from deemed savings algorithms or M&V plans for custom projects such as baseline energy use, operating hours, efficiency performance, and potentially interactive effects.

1.2.1.3 Realization Rates

The evaluated savings are based on project-level realization rate calculations that are then weighted to represent program-level and then portfolio-level realization rates. These realization rates incorporate any adjustments for incorrect application of deemed savings values and any

equipment details determined through the tracking system and desk reviews. For example, baseline assumptions or hours of use may be corrected through the evaluation and thus affect the realization rates. In order to calculate evaluated savings, we apply the realization rate determined from the EM&V sample to the population of projects. A flow chart of the realization rate calculations is shown in Figure 1.

Figure 1. Realization Rate Flowchart



1.2.1.4 Program Documentation Score

The EM&V team assigned a "program documentation" score of good, fair, or limited based on the level of program documentation provided to complete a third-party, due diligence review of claimed savings.

Program documentation scores were assigned as follows:

- **Good:** at least 90 percent of sampled projects have sufficient documentation.

- **Fair:** 70-89 percent of sampled projects have sufficient documentation; the remaining sampled projects had limited or no documentation.
- **Limited:** less than 70 percent of the sampled projects have sufficient documentation.

Sufficient documentation is defined as the necessary information required to verify savings. For nonresidential programs, this included completed savings calculators, customer invoices, pre- and post-inspection reports, and equipment cut sheets. For residential programs, the documentation provided all inputs needed to replicate the savings calculations based on the deemed savings manual or the approved calculation method as well as supporting materials.

Limited documentation is defined as the documentation that was provided to verify some, but not all, key inputs to savings calculations.

No documentation is defined as only the savings calculator or measure attributes were provided with no supporting materials.

1.2.2 Cost-Effectiveness Testing

The EM&V team conducted cost-effectiveness testing using the PACT method using PY2019 actual results, except for low-income programs, as discussed below. Cost-effectiveness tests were run using a uniform model for all utilities. The EM&V team collected required inputs for the model from several sources, including program tracking data, deemed savings, the PUCT, and utilities. Table 1 lists the required inputs to the cost-effectiveness model and the sources of information.

Table 1. Cost-Effectiveness Model Inputs and Sources

Model input	Measurement level	Source
Reported energy/demand savings	Measure type	EM&V database
Summer/winter peak coincidence factors (CF)	Measure type	Deemed savings
Effective useful life	Measure type	Deemed savings
Incentive payments	Program	Energy Efficiency Plan and Report (EEPR)
Administrative and research and development (R&D) costs	Program/portfolio	EEPRs
EM&V costs[2]	Program/portfolio	EM&V team budgets
Performance bonus[3]	Portfolio	EEPRs
Avoided costs	Statewide	PUCT (utilities)
Weighted average cost of capital (WACC)	Utility	Utilities
Line loss factor (non-ERCOT utilities only)	Utility	Utilities
Realization rates	Program	Evaluation results

[2] EM&V costs were not known at the time of utilities' original cost-effectiveness analysis.
[3] Performance bonuses as an input into cost-effectiveness testing came into effect in 2012.

The EM&V team conducted PY2019 cost-effectiveness tests separately using claimed gross savings and evaluated gross savings. The model produces results at the portfolio, program category[4], and program levels.

All benefits and costs are expressed in PY dollars. Benefits resulting from energy savings occurring in future years are net to PY dollars using the utility's WACC as the discount rate.

When running program-level tests, if only portfolio or other grouped information was available, the EM&V team allocated data proportionate to costs (§25.182 (e)(6)). For example, the performance bonus was calculated for the overall portfolio and allocated to individual programs proportionate to the programs' costs associated with meeting demand and energy goals. These program costs include program administrative and incentive costs. Portfolio-level costs include the performance bonus, EM&V, administrative, and R&D costs.

Low-income programs were evaluated using the savings-to-investment ratio (SIR). This model only includes net incentive payments under program costs. The SIR methodology is only used when specifically testing the low-income programs.

Portfolio-level cost-effectiveness analyses are based on the PACT and are shown, including and excluding low-income and low-income/hard-to-reach customers.

The calculations used for the PACT cost-effectiveness methodology are in Appendix B.

In addition, the EM&V team reported the cost per lifetime kWh and kW. This is calculated by attributing costs to energy savings and avoided demand based on their portion of total benefits and applying that proportion to the total program costs.

1.2.3 Reporting

There are two EM&V report deliverables per PY: (1) impact evaluation reports, and (2) the Annual Statewide Portfolio Report. There are also a number of status reports, ad hoc reports, data collection and sampling deliverables, and interim results.

The impact evaluation reports are delivered separately for each utility and discussed with the PUCT and each utility *prior* to drafting the annual statewide portfolio report. This allows the EM&V team to discuss the impact results with the PUCT and utilities, receive their input, and conduct supplemental analysis if needed prior to the annual statewide portfolio report. The annual statewide portfolio report is a comprehensive report across all utility portfolios.

For PY2019, the metrics to be used as the basis for recommendations in the reports are the program's gross savings realization rate and associated program documentation score, tracking system and interval meter data reviews, desk reviews, on-site M&V findings including site-specific realization rates, and programs' cost-effectiveness.

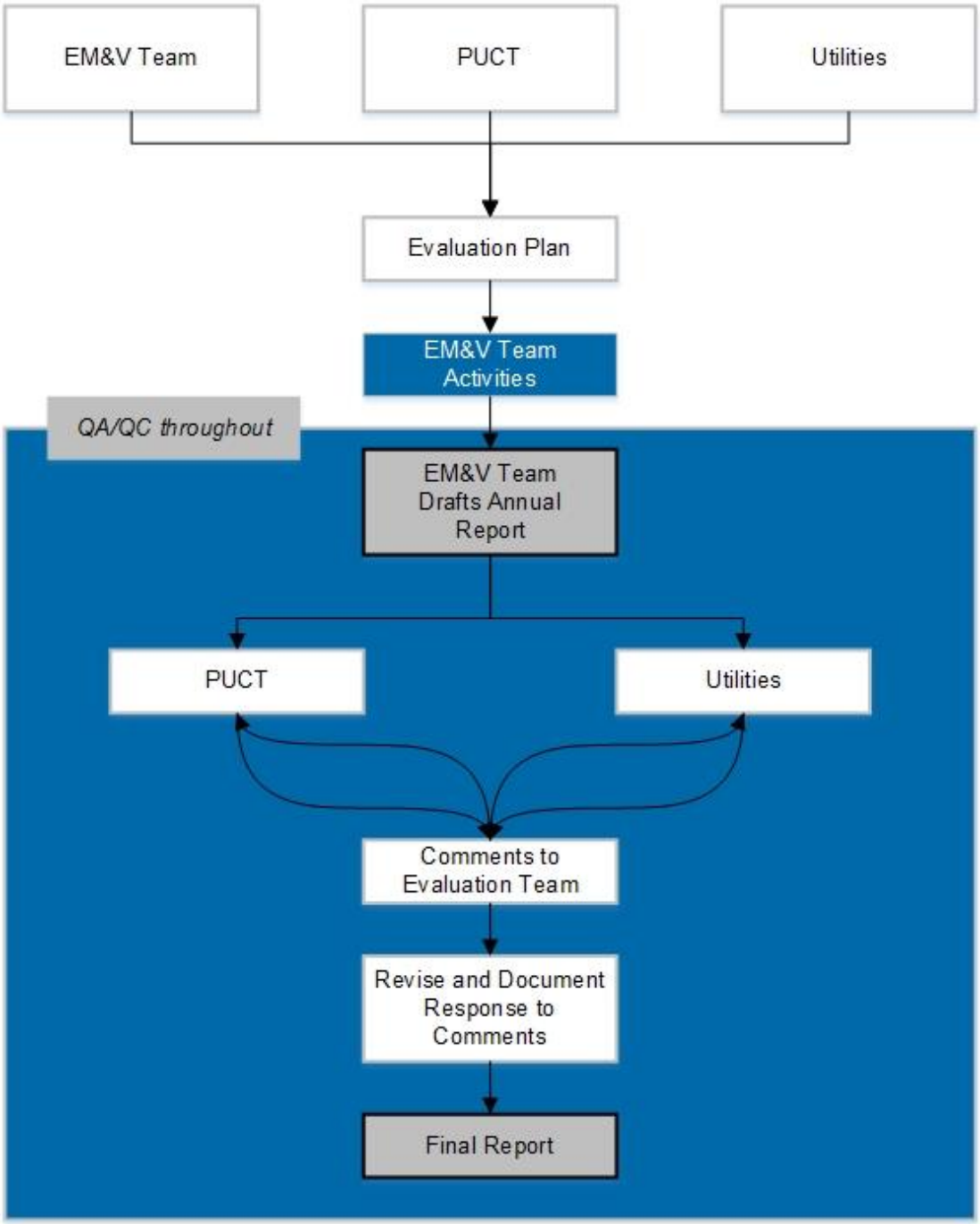
The EM&V database is at the core of reporting results. It houses the claimed and evaluated savings. The database allows structured queries to provide results by utilities, program categories and types, measure types, or sectors. QA and QC are conducted to ensure that results being entered into and extracted from the database are accurate. The EM&V team's QA/QC plan for the reported evaluated savings is in Appendix C.

[4] Program categories are currently defined as nonresidential, residential, low-income, load management, and pilots.

The EM&V team encourages feedback and comments on EM&V reports. The EM&V team reviews feedback and documents how it was taken into consideration in finalizing deliverables. While the interim impact reports are distributed and reviewed separately for each utility, the EM&V team seeks input from a larger group of stakeholders on the annual statewide portfolio report. These are presented and discussed at EEIP meetings between draft and final versions.

The flow chart in Figure 2 describes the general reporting process flow.

Figure 2. Reporting Flowchart



2.0 AMERICAN ELECTRIC POWER TEXAS CENTRAL COMPANY IMPACT EVALUATION RESULTS

This section presents the evaluated savings and cost-effectiveness results for American Electric Power Texas Central Company's (AEP TCC) energy efficiency portfolio. The key findings are summarized first, followed by details for each program in the portfolio that had a high or medium evaluation priority. Finally, a list of the low evaluation priority for which claimed savings were verified through the EM&V database are included.

2.1 KEY FINDINGS

2.1.1 Evaluated Savings

AEP TCC's evaluated savings for PY2019 were 39,665 in demand (kW) and 58,365,545 in energy (kWh) savings. The overall kW and kWh portfolio realization rates are approximately 100 percent. AEP TCC was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (see Table 5), which also supported healthy realization rates.

Table 2 shows the claimed and evaluated demand savings for AEP TCC's portfolio and broad customer sector/program categories.

Table 2. AEP TCC PY2019 Claimed and Evaluated Demand Savings

Level of analysis	Percentage portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Precision at 90% confidence
Total portfolio	**100.0%**	**39,662**	**39,665**	**100.0%**	**0.1%**
Commercial	25.1%	9,950	9,953	100.0%	0.2%
Residential	28.3%	11,218	11,218	100.0%	0.0%
Low-income	2.2%	869	869	100.0%	0.0%
Load management*	44.4%	17,612	17,612	100.0%	0.0%
Pilot	0.0%	13	13	100.0%	n/a

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Table 3 shows the claimed and evaluated energy savings for AEP TCC's portfolio and broad customer sector/program categories for PY2019.

Table 3. AEP TCC PY2019 Claimed and Evaluated Energy Savings

Level of analysis	Percentage portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Precision at 90% confidence
Total portfolio	**100.0%**	**58,337,806**	**58,365,545**	**100.0%**	**0.2%**
Commercial	62.4%	36,408,991	36,436,730	100.1%	0.3%
Residential	34.9%	20,375,757	20,375,757	100.0%	0.0%
Low-income	2.3%	1,350,919	1,350,919	100.0%	0.0%
Load management*	0.2%	103,072	103,071	100.0%	0.0%
Pilot	0.2%	99,067	99,067	100.0%	n/a

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Program-level realization rates are discussed in the detailed findings subsections. However, it is important to note that these results should only be viewed qualitatively due to the small sample sizes at the utility program level.

In program-level realization rates, we have also included a program documentation score of good, fair, or limited, as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent to 89 percent of the evaluated savings estimates received a score of good or fair. A score of "limited" was given if less than 70 percent of savings received a score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs or high savings programs have been identified. AEP TCC received a "good" program documentation score for all evaluated programs.

2.1.2 Cost-Effectiveness Results

AEP TCC's overall portfolio had a cost-effectiveness score of 2.3, or 2.6 excluding low-income programs.

The more cost-effective programs were Commercial Solutions MTP and Commercial Standard Offer Program (SOP). The less cost-effective programs were Targeted Low-Income Energy Efficiency Program and Residential Pool Pump Pilot MTP. The pilot did not pass cost-effectiveness but was not required to do so in its first year of operation.

The lifetime cost of evaluated savings was $0.012 per kWh and $20.28 per kW.

Table 4. AEP TCC Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total Portfolio	**2.3**	**2.3**	**2.1**
Total Portfolio excluding low-income programs	**2.6**	**2.6**	**2.3**
Commercial	**3.2**	**3.2**	**2.8**
Commercial Solutions MTP	4.5	4.6	4.0
Commercial SOP	3.6	3.6	3.3
CoolSaver A/C Tune-Up MTP	2.4	2.4	2.0
Open MTP	2.0	2.0	1.9
SCORE/CitySmart MTP	3.3	3.3	3.0
SMART Source Solar PV MTP	2.0	2.0	2.0
Residential	**2.1**	**2.1**	**1.9**
CoolSaver A/C Tune-Up MTP	1.6	1.6	1.3
High-Performance New Homes MTP	2.2	2.2	1.6
Residential SOP	2.3	2.3	2.1
SMART Source Solar PV MTP	1.8	1.8	1.8
Hard-to-Reach SOP	1.9	1.9	1.9
Low Income*	**1.4**	**1.4**	**1.4**
Targeted Low-Income Energy Efficiency Program*	1.4	1.4	1.4
Load Management	**2.0**	**2.0**	**2.0**
Load Management SOP	2.0	2.0	2.0
Pilot	**0.5**	**0.5**	**0.4**
Residential Pool Pump Pilot MTP	0.5	0.5	0.4

* The low-income program is evaluated using the SIR.

2.2 CLAIMED SAVINGS ADJUSTMENTS

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 5 summarizes claimed savings adjustments recommended by the EM&V team. Realization rates assume the following adjustments will be included in AEP TCC's June 1 filing.

Table 5. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF[5] Filing)

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial Solutions MTP	-2.90	-29,550.00
Commercial SOP	-7.70	-26,932.00
Open MTP	-1.30	-4,763.00
SCORE/CitySmart MTP	39.10	92,956.00
Total	**27.20**	**31,711.00**

2.3 DETAILED FINDINGS—COMMERCIAL (MEDIUM EVALUATION PRIORITY)

2.3.1 Commercial Solutions Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
2.5%	1,001	1,000	99.9%	9.4%	5,499,427	5,514,069	100.3%	Good

Completed desk reviews*	On-site M&V
6	3

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for five projects. Two projects had adjustments of less than five percent, and three projects had adjustments greater than five percent compared to the originally claimed savings. AEP TCC accepted the evaluated results and matched the claimed savings to those of the evaluations for the projects with significant adjustments, and therefore, the final program realization rates are nearly 100 percent kW and 101 percent kWh. Further details of the EM&V findings are provided below.

Participant ID 1201115: The energy efficiency project included interior lighting retrofits at a large retail store with a supermarket. During the desk review and on-site M&V visit, the EM&V team adjusted both the pre- and post-retrofit quantities for several locations in the

[5] Energy efficiency cost recovery factor

building. Overall, the adjustments resulted in realization rates of 100 percent for both kW and 106 percent kWh.

Participant ID 1201154: The energy efficiency project included interior lighting retrofits at a large 24-hour retail store. During the desk review, the EM&V team corrected the climate zone from zone 3 (Houston area) to zone 4 (Corpus Christi area). This adjusted the coincidence factor for peak kW. In addition, the pre-retrofit quantity of lamps that were not replaced was adjusted to zero in the calculator. This decreased the baseline consumption and did not affect the post-retrofit consumption, which resulted in zero savings for these lamps. Overall, the adjustments resulted in realization rates of 94 percent for both kW and kWh.

Participant ID 1237483: The energy efficiency project included exterior lighting retrofits at a retail strip mall. During the desk review and on-site M&V visit, the EM&V team adjusted the quantity for one line item in the calculator from eight light-emitting diode (LED) fixtures claimed to six. In addition, the wattage of one LED fixture was adjusted from 199.0 W to 199.5 W based on the DesignLights™ Consortium (DLC) qualified products list. The 2019 version of the lumens per square foot (LSF) calculator allows for wattages in 0.5 increments; therefore, the rated wattage was rounded to the nearest half-watt denomination. Overall, the corrections resulted in a negligible increase in peak demand and energy savings and realization rates of 100 percent for both kW and kWh.

Participant ID 1239494: The energy efficiency project was a new construction warehouse that installed LED fixtures with occupancy sensors inside and timeclocks outside. During the desk review, the EM&V team corrected the climate zone from zone 1 (Amarillo area) to zone 3 (Houston area). This adjusted the coincidence factor for peak kW. In addition, wattages for several installed fixtures were rounded incorrectly, resulting in the adjustment of one fixture from 175.0 W to 175.5 W and one fixture from 247.0 W to 247.5 W in the LSF calculator. Overall, the corrections resulted in realization rates of 97 percent kW and 100 percent kWh.

Participant ID 1252316: The energy efficiency project included interior and exterior lighting retrofits at a warehouse. During the desk review, the EM&V team adjusted the savings calculation from a refrigerated warehouse and office to a non-refrigerated warehouse building type with air conditioning based upon photo documentation. This correction decreased both the peak and energy savings. Overall, the corrections resulted in realization rates of 99 percent kW and 92 percent kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, qualified products list (QPL) qualifications, AHRI (Air-conditioning, Heating, and Refrigeration Institute) certifications) for all projects that had desk reviews completed because sufficient documentation was provided for the sites. These were regular lighting projects where documentation included invoices, QPL qualifications, equipment specifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of “good.”

2.3.2 Commercial Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
7.9%	3,147	3,151	100.1%	24.5%	14,268,008	14,281,814	100.1%	Good

Completed desk reviews*	On-site M&V
12	6

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Commercial SOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for seven projects. Four projects had adjustments of less than five percent, and three projects had adjustments greater than five percent compared to the originally claimed savings. AEP TCC accepted the evaluated results and matched the claimed savings to those of the evaluations for the projects with significant adjustments; therefore, the final program realization rate is slightly above 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1229630: The energy efficiency project included interior lighting retrofits at a retail strip mall. During the desk review and on-site M&V visit, the EM&V team adjusted the quantity of LED tubes installed from eight to four. This adjustment resulted in a negligible increase in peak demand and energy savings and realization rates of 100 percent for both kW and kWh.

Participant ID 1229674: The energy efficiency project included the early replacement of three water-cooled chillers at a large office building. During the desk review and on-site M&V visit, the EM&V team slightly adjusted the baseline chiller size (from 70.0 tons to 76.1 tons) based on performance data gathered by the on-site engineer. Overall, the change in savings was minimal, and resulted in realization rates of 103 percent kW and 102 percent kWh.

Participant ID 1229716: The energy efficiency project included interior and exterior lighting retrofits and an early replacement of heating, ventilation, and air conditioning (HVAC) equipment at an office building. During the desk review, the EM&V team used the 2019 technical reference manual (TRM) calculation, which adjusted savings slightly from the submitted calculation, which followed the 2018 TRM calculation. The EM&V team also adjusted the installed HVAC unit model number based on the submitted post-install photos. This reduced the rated efficiency of the installed units, but they still qualified for incentives. In addition, three types of LED tube model numbers were adjusted to match the invoice submitted; the first had no adjustment to wattage consumed, the second fixture's wattage was adjusted from 44.0 W to 56.5 W, and the third fixture's wattage was adjusted from 22.0 W to 28.0 W using the DLC qualified product list. Overall, the

adjustments reduced peak demand and energy savings and resulted in the realization rates of 98 percent for kW and 87 percent for kWh.

Participant ID 1229939: The energy efficiency project included interior lighting retrofits at a retail store. During the desk review, the EM&V team adjusted the installed equipment wattage for a single type of LED tube by 0.5 W (from 15.0 W claimed to 14.5 W) to account for the 0.5 W increments allowed by the LSF calculator. Overall, the adjustments resulted in realization rates of 102 percent for both kW and kWh.

Participant ID 1229944: The energy efficiency project included interior and exterior lighting retrofits at a primary school. During the desk review and on-site M&V visit, the EM&V team adjusted wattages for several installed fixtures using the DLC and ENERGY STAR® qualified products lists: from 7.0 W claimed to 6.5 W, from 32.0 W claimed to 31.5 W, from 15.0 W claimed 14.5 W, from 124.0 W claimed to 123.5 W, and from 114.0 W claimed to 113.5 W. These adjustments were to account for the 0.5 W increments allowed by the LSF calculator. Overall, the adjustments increased peak demand and energy savings and resulted in the realization rates of 103 percent kW and 102 percent kWh.

Participant ID 157032: The energy efficiency project included interior lighting retrofits at a retail building. During the desk review and M&V phone interview, the EM&V team adjusted the quantity of two fixture types, one- and two-lamp recessed fixtures and downlights. Overall, the adjustments resulted in realization rates of 94 percent for both kW and kWh.

Participant ID 1257127: The energy efficiency project included the new construction of a secondary school that installed 64 packaged rooftop air conditioning units and installed energy efficient lighting. During the desk review, the EM&V team adjusted the capacity of the rooftop air conditioning units to match the AHRI-rated value instead of the nominal capacity. Overall, the adjustments resulted in realization rates of 94 percent kW and 97 percent kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for 10 of the 12 projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation at these sites included invoices, QPL qualifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment. However, partial documentation was provided for the other two projects—one was missing post-install photos and final calculator, and the other was missing a significant amount of documentation including the pre- and post-install calculators, pre-install photos, pre- and post-install field notes, itemized invoices, and several rating certifications. Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. Overall, the EM&V team assigned a program documentation score of “good.”

2.3.3 Open Market Transformation Program (MTP)

Program contribution to Portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
2.2%	863	863	100.0%	6.0%	3,487,391	3,487,508	100.0%	Good

Completed desk reviews*	On-site M&V
8	4

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Open MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for six projects. One project had adjustments of less than five percent, and five projects had adjustments greater than five percent compared to the originally claimed savings. AEP TCC accepted the evaluated results and matched the claimed savings to those of the evaluations for the projects with significant adjustments, and therefore, the final program realization rate is nearly 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1201021: The energy efficiency project included interior lighting retrofits at a service building. During the desk review and on-site M&V visit, the EM&V team corrected the wattage and quantity of the LED lighting installed. The installed lighting LED tubes were adjusted from 18.0 W to 21.5 W using the DLC qualified products list. In addition, the quantity of installed LED tubes was reduced to 98, as identified during the on-site visit. Overall, the adjustments resulted in realization rates of 92 percent for both kW and kWh.

Participant ID 1201083: The energy efficiency project included interior lighting retrofits at a service building. During the desk review and on-site M&V visit, the EM&V team corrected the wattage and quantity of the LED lighting installed. One lighting LED tube model installed was adjusted from 18.0 W to 20.5 W using the DLC qualified products list. In addition, the quantity of LED tubes installed was reduced from 70 to 66 as identified during the on-site visit. Overall, the adjustments resulted in realization rates of 95 percent for both kW and kWh.

Participant ID 1201089: The energy efficiency project included interior lighting retrofits at an office building. During the desk review, the EM&V team adjusted wattages for the installed LED tubes from 18.0 W claimed to 20.5 W using the DLC qualified products list. Overall, the adjustments resulted in realization rates of 93 percent for both kW and kWh.

Participant ID 1236307: The energy efficiency project included interior lighting retrofits at a strip mall. During the desk review, the EM&V team adjusted wattages for the installed LED tubes from 18.0 W claimed to 20.0 W using the DLC qualified products list. Overall, these corrections decreased peak demand and energy savings and resulted in realization rates of 93 percent kW and 95 percent kWh.

Participant ID 1236313: The energy efficiency project included interior lighting retrofits at a service building. During the desk review and on-site M&V visit, the EM&V team corrected wattages for two installed LED tubes—the four-foot-long tube was adjusted from 18.0 W claimed to 20.0 W, and the eight-foot-long tube was adjusted from 42.0 W claimed to 41.5 W. Overall, these corrections decreased peak demand and energy savings and resulted in realization rates of 91 percent kW and 93 percent kWh.

Participant ID 128410: The energy efficiency project included interior lighting retrofits at a strip mall. During the desk review and on-site M&V visit, the EM&V team adjusted the quantity of the LED tubes from 90 claimed to 88. This correction slightly increased peak demand and energy savings and resulted in realization rates of 101 percent for both kW and kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for five projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications, equipment specification, post-inspection notes, the project savings calculations, and photographic documentation. However, the three projects sampled in Q3 did not have the calculator files available for documentation. Each project calculations were provided with the Q4 documentation. Complete documentation at the time of energy savings evaluation enhances the accuracy and transparency of project savings along with ease of evaluation. Although the calculator was delivered later than expected, it was provided before the last data request. Overall, the EM&V team assigned a program documentation score of "good."

2.3.4 SCORE/CitySmart Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
4.7%	1,867	1,867	100.0%	11.4%	6,648,742	6,647,916	100.0%	Good

Completed desk reviews*	On-site M&V
4	2

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 SCORE/CitySmart MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for all four projects. Two project had adjustments of less than five percent, and two projects had adjustments greater than five percent compared to the originally claimed savings. AEP TCC accepted the evaluated results and matched the

claimed savings to those of the evaluations for the projects with significant adjustments, and therefore, the final program realization rate is nearly 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1200834: The energy efficiency project included exterior lighting retrofits at a vehicle bridge. During the desk review and on-site M&V visit, the EM&V team adjusted the quantity of exterior pole-mounted fixtures replaced based on change orders that occurred during installation. This correction increased peak demand and energy savings and resulted in realization rates of 128 percent for both kW and kWh.

Participant ID 1201094: The energy efficiency project included interior and exterior lighting retrofits at a high school. During the desk review, the EM&V team corrected wattages for one model of installed LED tube from 18.0 W claimed to 19.0 W. In addition, several equipment classifications were adjusted from *LED-FIXT* (fixture) to *LED-SCRW* (screw-in lamp), although this adjustment did not impact ex-post energy savings. Overall, the corrections decreased peak demand and energy savings and resulted in realization rates of 99 percent for both kW and kWh.

Participant ID 1251687: The energy efficiency project included interior and exterior lighting retrofits at a school building. During the desk review and on-site M&V visit, the EM&V team adjusted the quantity for one line-item in the LSF calculator from four LED tubes to two. In addition, one exterior line item was moved to the interior section of the LSF calculator because this area was found to be an electrical/mechanical closet that is only accessible from the interior. Overall, the corrections resulted in realization rates of 100 percent for both kW and kWh.

Participant ID 1252257: The energy efficiency project included a controls upgrade for HVAC system, including a building management system (BMS) and new temperature setpoints at a school building. During the desk review, the EM&V team adjusted the peak kW calculation method to match the top 20 PDPF (peak demand probability factor) methodology in the TRM. The adjusted calculation increased peak demand and resulted in realization rates of 117 percent kW and 100 percent kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for three of the four projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications, equipment specifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment, which are significant efforts by the utility to verify equipment conditions and quantities. However, partial documentation was provided for the other project because it was a custom project and required more detailed descriptions of the activity completed. Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. Overall, the EM&V team assigned a program documentation score of “good.”

2.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

2.4.1 Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
44.4%	17,612	17,612	100.0%	0.2%	103,072	103,071	100.0%	Good

Completed desk reviews*	On-site M&V
N/A	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

The EM&V team evaluated the Commercial Load Management SOP by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments at the electric service identifier (ESI ID) level. Load management events in PY2019 occurred on the following dates and times:

- May 20, 2019, from 3:00 p.m. to 4:00 p.m. (scheduled)
- August 12, 2019, from 3:00 p.m. to 6:00 p.m. (unscheduled)
- August 12, 2019, from 3:00 p.m. to 5:00 p.m. (unscheduled)
- August 13, 2019, from 3:00 p.m. to 6:00 p.m. (unscheduled)
- August 13, 2019, from 3:00 p.m. to 5:00 p.m. (unscheduled)

The EM&V team received interval meter data as well as a spreadsheet that summarized the event-level savings for the seven sponsors across 81 sites. Only 54 of the sites participated in the scheduled event, which was used as a test event. Fourteen of the 81 sites participated in the unscheduled events that occurred from 3:00 p.m. to 6:00 p.m., and 50 sites participated in the unscheduled events that occurred from 3:00 p.m. to 5:00 p.m. Seven sites did not have any load data associated with them as they did not participate in any event.

AEP TCC calculated kW savings for each site by applying a weighted average to the kW reductions across the unscheduled events. To calculate kWh savings, AEP TCC summed kW reductions of all events (including the scheduled event) and multiplied it by the total number of event hours. In applying this method to the meter-level data and following the TRM, the EM&V team calculated kW and kWh savings that matched that of AEP TCC. A negligible difference in kWh is attributed to rounding practices during calculations. The table above shows both the EM&V team and AEP TCC's calculated kW and kWh savings.

Evaluated savings for the Load Management SOP are 17,612 kW and 103,071 kWh. The realization rate for both kW and kWh is 100 percent.

2.5 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 6 provides a summary of claimed savings for AEP TCC's programs in PY2019 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2019 tracking data provided to the EM&V team for the EM&V database.

Table 6. PY2019 Claimed Savings (Tracking-System-Only Evaluated Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
CoolSaver A/C Tune-Up MTP (Com)	7.3%	2,883	2,883	100.0%	10.1%	5,897,031	5,897,031	100.0%
High-Performance New Homes MTP	3.9%	1,530	1,530	100.0%	3.5%	2,037,375	2,037,375	100.0%
Residential SOP	15.7%	6,218	6,218	100.0%	18.0%	10,489,450	10,489,450	100.0%
CoolSaver A/C Tune-Up MTP (Res)	3.0%	1,202	1,202	100.0%	6.7%	3,937,486	3,937,486	100.0%
Hard-to-Reach SOP	5.3%	2,106	2,106	100.0%	5.7%	3,340,316	3,340,316	100.0%
Targeted Low-Income Energy Efficiency Program	2.2%	869	869	100.0%	2.3%	1,350,919	1,350,919	100.0%

2.6 SUMMARY OF LOW PRIORITY EVALUATION PROGRAMS

Table 7 provides a summary of claimed savings for AEP TCC's low evaluation priority programs in PY2019, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2019 tracking data provided to the EM&V team for the EM&V database.

Table 7. PY2019 Claimed Savings (Low Evaluation Priority Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
SMART Source Solar PV MTP (Com)	0.5%	189	189	100.0%	1.0%	608,392	608,392	100.0%
SMART Source Solar PV MTP (Res)	0.4%	161	161	100.0%	1.0%	571,131	571,131	100.0%
Residential Pool Pump Pilot MTP	0.0%	13	13	100.0%	0.2%	99,067	99,067	100.0%

3.0 AMERICAN ELECTRIC POWER TEXAS NORTH COMPANY IMPACT EVALUATION RESULTS

This section presents the evaluated savings and cost-effectiveness results for American Electric Power Texas North Company's (AEP TNC) energy efficiency portfolio. The key findings are summarized first, followed by details for each program in the portfolio that had a high or medium evaluation priority. Finally, a list of the low evaluation priority for which claimed savings were verified through the EM&V database are included.

3.1 KEY FINDINGS

3.1.1 Evaluated Savings

AEP TNC's evaluated savings for PY2019 were 6,582 in demand (kW) and 11,989,010 in energy (kWh) savings. The overall kW and kWh portfolio realization rates are approximately 100 percent. AEP TNC was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (see Table 11), which also supported healthy realization rates.

Table 8 shows the claimed and evaluated demand savings for AEP TNC's portfolio and broad customer sector/program categories.

Table 8. AEP TNC PY2019 Claimed and Evaluated Demand Savings

Level of analysis	Percentage portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Precision at 90% confidence
Total portfolio	**100.0%**	**6,582**	**6,582**	**100.0%**	**0.0%**
Commercial	27.1%	1,786	1,786	100.0%	0.1%
Residential	26.5%	1,742	1,742	100.0%	0.0%
Low-income	1.8%	119	119	100.0%	0.0%
Load management*	44.6%	2,935	2,935	100.0%	0.0%

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Table 9 shows the claimed and evaluated energy savings for AEP TNC's portfolio and broad customer sector/program categories for PY2019.

Table 9. AEP TNC PY2019 Claimed and Evaluated Energy Savings

Level of analysis	Percentage portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Precision at 90% confidence
Total portfolio	**100.0%**	**11,988,626**	**11,989,010**	**100.0%**	**0.1%**
Commercial	71.8%	8,605,789	8,606,175	100.0%	0.1%
Residential	26.4%	3,162,462	3,162,462	100.0%	0.0%
Low-income	1.7%	199,824	199,824	100.0%	0.0%
Load management*	0.2%	20,550	20,549	100.0%	0.0%

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Program-level realization rates are discussed in the detailed findings subsections. However, it is important to note that these results should only be viewed qualitatively due to the small sample sizes at the utility program level.

In program-level realization rates, we have also included a program documentation score of good, fair, or limited, as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent to 89 percent of the evaluated savings estimates received a score of good or fair. A score of "limited" was given if less than 70 percent of savings received a score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs or high savings programs have been identified.

AEP TNC received "good" documentation scores for all evaluated programs except its Commercial SOP, which received a "fair" documentation score.

3.1.2 Cost-Effectiveness Results

AEP TNC's overall portfolio had a cost-effectiveness of 2.2, or 2.5 excluding low-income programs.

The more cost-effective programs were Commercial Standard Offer Program (SOP) and SCORE/CitySmart Market Transformation Program (MTP). The less cost-effective programs were the Targeted Low-Income Energy Efficiency Program and Commercial SMART Source Solar PV MTP. The low-income program falls just slightly short of 1.0 using the SIR test (.95 cost-effectiveness, which rounds to 1.0 in the table below). This may be a result of a small difference in the average rate being used by the EM&V team and AEP[8]. The lifetime cost of evaluated savings was $0.012 per kWh and $19.52 per kW.

Table 10. AEP TNC Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total Portfolio	**2.2**	**2.2**	**2.1**
Total Portfolio excluding low-income programs	**2.5**	**2.5**	**2.3**
Commercial	**2.7**	**2.7**	**2.5**
Commercial Solutions MTP	3.2	3.2	2.8
Commercial SOP	3.8	3.8	3.4
Open MTP	1.4	1.4	1.3
SCORE/CitySmart MTP	3.7	3.7	3.3
SMART Source Solar PV MTP	1.2	1.2	1.2
Residential	**2.2**	**2.2**	**2.1**
Residential SOP	2.5	2.5	2.2
SMART Source Solar PV MTP	2.0	2.0	2.0
Hard-to-Reach SOP	2.0	2.0	2.0
Low Income*	**1.0**	**1.0**	**1.0**
Targeted Low-Income Energy Efficiency Program*	1.0	1.0	1.0
Load Management	**1.8**	**1.8**	**1.8**
Load Management SOP	1.8	1.8	1.8

* The low-income program is evaluated using the SIR.

3.2 CLAIMED SAVINGS ADJUSTMENTS

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 11 summarizes claimed savings adjustments recommended by the EM&V team. Realization rates assume the following adjustments will be included in AEP TNC's June 1 filing.

Table 11. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF[6] Filing)

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial SOP	-55.90	-239,603.00
Open MTP	-3.30	-15,489.00
Total	**-59.20**	**-255,092.00**

[6] Energy efficiency cost recovery factor

3.3 DETAILED FINDINGS—COMMERCIAL (MEDIUM EVALUATION PRIORITY)

3.3.1 Commercial Solutions Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
9.3%	615	615	100.0%	26.9%	3,227,496	3,227,486	100.0%	Good

Completed desk reviews*	On-site M&V
4	2

* Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above. The EM&V team did not suggest any savings adjustments, and therefore, the final program realization rate is 100 percent.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for three of the four projects that had desk reviews completed because sufficient documentation was provided for the sites. These were regular lighting projects where documentation included invoices, QPL qualifications, equipment specifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment, which are significant efforts by the utility to verify equipment conditions and quantities. However, one midstream lighting project had limited documentation about the lighting equipment QPL certifications, project site type, and savings calculations. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of “good.”

3.3.2 Commercial Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
7.1%	469	469	100.0%	18.5%	2,213,656	2,214,298	100.0%	Fair

Completed desk reviews*	On-site M&V

4	2

* Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Commercial SOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for three projects. Two projects had adjustments of less than five percent, and one project had adjustments greater than five percent compared to the originally claimed savings. AEP TNC accepted the evaluated results and matched the claimed savings to those of the evaluations for the project with significant adjustments, and therefore, the final program realization rate is nearly 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1198238: The energy efficiency project included interior and exterior lighting retrofits at a retail building. During the desk review and on-site M&V visit, the EM&V team adjusted wattages for several installed fixtures using the DLC qualified products lists: from 40.0 W claimed to 42.0 W, from 100.0 W claimed to 98.5 W, from 10.0 W claimed to 13.5 W, from 16.5 W claimed to 17.0 W, from 109.0 W claimed to 108.0 W, from 105.0 W claimed to 105.5 W, and from 112.0 W claimed to 114.0 W. The TRM allows for wattages in 0.5 increments; therefore, for some fixtures, the rated wattages were adjusted to the closest half-watt. In addition, the quantity was corrected for several lighting fixtures (from 36 claimed fixtures to 40 and from 10 claimed to 7) to match actual equipment installed. Overall, the adjustments resulted in the realization rate remaining at 100 percent kW and kWh.

Participant ID 1198240: The energy efficiency project included interior lighting retrofit at a manufacturing facility that was converted to a warehouse building. During the desk review and on-site M&V visit, the EM&V team adjusted the savings calculation from a retrofit to a new construction warehouse because the project was a major retrofit and change of facility type. This correction significantly decreased peak and energy savings. In addition, wattages for several installed fixtures were rounded incorrectly from 69.1 W per DLC certification to 69.5 W. These wattages were adjusted to 69 W. Overall, the corrections resulted in realization rates of 66 percent kW and kWh.

Participant ID 1224591: The energy efficiency project included an interior lighting retrofit at an enclosed mall retail facility. During the desk review, the EM&V team adjusted the installed equipment wattage for a single type of lighting fixture by 0.5 W (from 32.0 W claimed to 31.5 W) to account for the 0.5 W increment allowed by the TRM. Overall, the change in the savings calculation approach was minimal, and the realization rate for both kW and kWh remained at 100 percent.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for three projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation at these sites included invoices, QPL qualifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new

equipment. However, partial documentation was provided for the other project, which was missing the pre- and post-calculators, AHRI certification, and post-install notes to accompany the post-install photos. Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. Overall, the EM&V team assigned a program documentation score of "fair."

3.3.3 Open Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
4.9%	325	325	100.0%	11.1%	1,331,577	1,331,331	100.0%	Good

Completed desk reviews*	On-site M&V
4	2

* Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Open MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for all four projects. Three projects had adjustments of less than five percent, and one project had adjustments greater than five percent compared to the originally claimed savings. AEP TNC accepted the evaluated results and matched the claimed savings to those of the evaluations for the project with significant adjustments, and therefore, the final program realization rate is nearly 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1200852: The energy efficiency project included an exterior lighting retrofit. During the desk review and on-site M&V visit, the EM&V team noted that the project included the replacement of three 1,500 W lighting fixtures, which were calculated as forty-five 100 W fixtures, overestimating the baseline energy consumption. The EM&V team corrected the calculation to match actual baseline conditions. This correction significantly decreased peak and energy savings. In addition, the on-site M&V found that the quantity of LED fixtures installed at one location was 6 fixtures (adjusted from 2). Overall, the corrections resulted in realization rates of 49 percent kW and 53 percent kWh.

Participant ID 1201038: The energy efficiency project included interior lighting retrofits at a strip mall retail facility. During the desk review, the EM&V team corrected wattages for an installed fixture from 42.0 W claimed to 41.0 W using the DLC qualified products list. Overall, this adjustment slightly increased peak demand and energy savings and resulted in realization rates of 101 percent kW and kWh.

Participant ID 1201043: The energy efficiency project included an interior lighting retrofit at a retail facility. During the desk review and on-site M&V visit, the EM&V team adjusted the wattages for several installed fixtures to the closest half-watt allowed by the TRM. In

addition, it appears that the lighting control savings were manually adjusted in the tracking system but included in the final calculator. This was supported by the on-site M&V, which identified that the occupancy sensors were removed. Overall, these corrections resulted in a small decrease in energy savings and realization rates of 98 percent kW and kWh.

Participant ID 1250835: The energy efficiency project included interior lighting retrofits at a construction equipment rental and retail location. During the desk review, the EM&V team corrected the lighting equipment classification from *integrated ballast LED* to *LED fixture* for one installed fixture. This adjustment did not change the overall project savings. The realization rates remained at 100 percent kW and kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for two projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications, equipment specifications, post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment. However, partial documentation was provided for the other two projects. Each project was missing documentation to confirm equipment installed, including equipment specification sheets or invoices. Since the projects were small business projects, it was not expected to include pre-install and post-install calculators. Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. Overall, the EM&V team assigned a program documentation score of "good."

3.3.4 SCORE/CitySmart Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
5.0%	328	328	100.0%	14.0%	1,680,000	1,680,000	100.0%	Good

Completed desk reviews*	On-site M&V
2	1

* Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 SCORE/CitySmart MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above. The EM&V team did not suggest any savings adjustments, and therefore, the final program realization rate is 100 percent.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for both projects that had desk reviews completed because sufficient documentation was provided for the sites. Project

documentation included invoices, QPL qualifications, equipment specifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment, which are significant efforts by the utility to verify equipment conditions and quantities. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of “good.”

3.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

3.4.1 Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
44.6%	2,935	2,935	100.0%	0.2%	20,550	20,549	100.0%	Good

Completed desk reviews*	On-site M&V
N/A	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

The EM&V team evaluated the Load Management SOP by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments at the ESI ID level. Load management events in PY2019 occurred on the following dates and times:

- May 20, 2019, from 4:00 p.m. to 5:00 p.m. (scheduled)
- August 12, 2019, from 4:00 p.m. to 7:00 p.m. (unscheduled)
- August 12, 2019, from 4:00 p.m. to 6:00 p.m. (unscheduled)
- August 13, 2019, from 3:00 p.m. to 6:00 p.m. (unscheduled)
- August 13, 2019, from 3:00 p.m. to 5:00 p.m. (unscheduled)

The EM&V team received interval meter data as well as a spreadsheet that summarized the event-level savings for the four sponsors across 23 sites. Twenty sites participated in the scheduled event that was used as a test event. Eleven of the 23 sites participated in the three-hour unscheduled events, and eight sites participated in the two-hour unscheduled events. Four sites did not have any load data associated with them as they did not participate in any event.

AEP TNC calculated kW savings for each site by applying a weighted average to the kW reductions across the unscheduled events. To calculate kWh savings, AEP TNC summed kW reductions of all events (including the scheduled event) and multiplied it by the total number of event hours. In applying this method to the meter level data and following the TRM, the EM&V team calculated kW and kWh savings that matched that of AEP TNC. A negligible difference in kWh is attributed to rounding practices during calculations. The table above shows both the EM&V team and AEP TNC's calculated kW and kWh savings.

The evaluated savings for the Load Management SOP are 2,935 kW and 20,549 kWh. The realization rate for both kW and kWh is 100 percent.

3.5 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 12 provides a summary of claimed savings for AEP TNC's programs in PY2019 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2019 tracking data provided to the EM&V team for the EM&V database.

Table 12. PY2019 Claimed Savings (Tracking-System-Only Evaluated Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Residential SOP	16.0%	1,054	1,054	100.0%	15.4%	1,844,161	1,844,161	100.0%
Hard-to-Reach SOP	9.1%	600	600	100.0%	8.3%	994,684	994,684	100.0%
Targeted Low-Income Energy Efficiency Program	1.8%	119	119	100.0%	1.7%	199,824	199,824	100.0%

3.6 SUMMARY OF LOW PRIORITY EVALUATION PROGRAMS

Table 13 provides a summary of claimed savings for AEP TNC's low evaluation priority programs in PY2019, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2019 tracking data provided to the EM&V team for the EM&V database.

Table 13. PY2019 Claimed Savings (Low Evaluation Priority Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
SMART Source Solar PV MTP (Com)	0.7%	49	49	100.0%	1.3%	153,060	153,060	100.0%
SMART Source Solar PV MTP (Res)	1.3%	88	88	100.0%	2.7%	323,617	323,617	100.0%

4.0 CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC IMPACT EVALUATION RESULTS

This section presents the evaluated savings and cost-effectiveness results for CenterPoint Energy Houston Electric, LLC's (CenterPoint) energy efficiency portfolio. The key findings are summarized first, followed by details for each program in the portfolio that had a high or medium evaluation priority. Finally, a list of the low evaluation priority for which claimed savings were verified through the EM&V database are included.

4.1 KEY FINDINGS

4.1.1 Evaluated Savings

CenterPoint's evaluated savings for PY2019 were 193,946 in demand (kW) and 213,808,816 in energy (kWh) savings. The overall kW and kWh portfolio realization rates are approximately 100 percent. CenterPoint was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (see Table 17), which also supported healthy realization rates.

Table 14 shows the claimed and evaluated demand savings for CenterPoint's portfolio and broad customer sector/program categories.

Table 14. CenterPoint PY2019 Claimed and Evaluated Demand Savings

Level of analysis	Percentage portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Precision at 90% confidence
Total portfolio	**100.0%**	**193,945**	**193,946**	**100.0%**	**0.0%**
Commercial	10.5%	20,360	20,360	100.0%	0.0%
Residential	14.3%	27,769	27,769	100.0%	0.0%
Low-income	2.2%	4,329	4,329	100.0%	0.0%
Load management*	73.0%	141,487	141,488	100.0%	0.0%
Pilot	0.0%	0	0	n/a	n/a

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Table 15 shows the claimed and evaluated energy savings for CenterPoint's portfolio and broad customer sector/program categories for PY2019.

Table 15. CenterPoint PY2019 Claimed and Evaluated Energy Savings

Level of analysis	Percentage portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Precision at 90% confidence
Total portfolio	**100.0%**	**213,808,816**	**213,808,816**	**100.0%**	**0.0%**
Commercial	58.9%	125,995,633	125,995,633	100.0%	0.0%
Residential	36.4%	77,863,862	77,863,862	100.0%	0.0%
Low-income	3.1%	6,710,433	6,710,433	100.0%	0.0%
Load management*	0.4%	848,928	848,928	100.0%	0.0%
Pilot	1.1%	2,389,960	2,389,960	100.0%	n/a

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Program-level realization rates are discussed in the detailed findings subsections. However, it is important to note that these results should only be viewed qualitatively due to the small sample sizes at the utility program level.

In program-level realization rates, we have also included a program documentation score of good, fair, or limited, as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent to 89 percent of the evaluated savings estimates received a score of good or fair. A score of "limited" was given if less than 70 percent of savings received a score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs or high savings programs have been identified.

CenterPoint received a "good" documentation score for all evaluated programs.

4.1.2 Cost-Effectiveness Results

CenterPoint's overall portfolio had a cost-effectiveness of 2.6, or 2.8 excluding low-income programs.

The more cost-effective programs were Advanced Lighting (both commercial and residential) and CenterPoint Energy High Efficiency Homes® MTP. The less cost-effective programs were Multifamily MTP and Residential Demand Response Program. The Multifamily MTP did not pass cost-effectiveness for the market-rate sector.

The lifetime cost of evaluated savings was $0.011 per kWh and $18.08 per kW.

Table 16. CenterPoint Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total Portfolio	**2.6**	**2.6**	**2.2**
Total Portfolio excluding low-income programs	**2.8**	**2.8**	**2.4**
Commercial	**2.8**	**2.8**	**2.5**
Large Commercial SOP	3.3	3.3	3.0
Commercial MTP (SCORE, Healthcare , Data Center)	2.6	2.6	2.3
Retro-Commissioning MTP	1.4	1.4	1.3
REP (Commercial CoolSaver)	2.4	2.4	1.9
Advanced Lighting Commercial	5.7	5.7	5.1
Residential	**3.1**	**3.1**	**2.5**
REP (CoolSaver & Efficiency Connection)	1.5	1.5	1.2
Residential & SC SOP	1.4	1.4	1.2
Advanced Lighting Residential	9.1	9.1	8.2
Residential Pool Pump & A/C Distributor MTP	2.0	2.0	1.7
Multi-Family MTP	0.8	0.8	0.6
CenterPoint Energy High Efficiency Homes MTP	3.9	3.9	2.7
Hard-to-Reach SOP	1.1	1.1	1.1
Multi-Family MTP (HTR)	0.8	0.8	0.8
Low Income*	**3.0**	**3.0**	**3.0**
Targeted Low Income MTP (Agencies in Action)*	3.0	3.0	3.0
Load Management	**1.7**	**1.7**	**1.7**
Large Commercial Load Management SOP	1.9	1.9	1.9
Residential Demand Response Program	1.0	1.0	1.0
Pilot	**1.2**	**1.2**	**1.0**
Smart Thermostat Program (Pilot)	1.2	1.2	1.0

* The low-income program is evaluated using the SIR.

4.2 CLAIMED SAVINGS ADJUSTMENTS

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 17 summarizes claimed savings adjustments recommended by the EM&V team. Realization rates assume the following adjustments will be included in CenterPoint's June 1 filing.

Table 17. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF[7] Filing)

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial MTP (SCORE, Healthcare, Data Center)	-359.90	-279,511.70
Large Commercial Load Management SOP	302.50	1,815.40
Large Commercial SOP	5.10	43,320.00
Total	**-52.30**	**-234,376.30**

4.3 DETAILED FINDINGS—COMMERCIAL (MEDIUM EVALUATION PRIORITY)

4.3.1 Commercial Market Transformation Program (MTP) (SCORE, Healthcare, Data Center)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
5.0%	9,670	9,670	100.0%	29.6%	63,217,038	63,217,038	100.0%	Good

Completed desk reviews*	On-site M&V
21	10

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Commercial MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for ten projects. Five projects had adjustments of less than five percent, and five projects had adjustments greater than five percent compared to the originally claimed savings. CenterPoint accepted the evaluated results and matched the claimed savings to those of the evaluations for the projects with significant adjustments, and therefore, the final program realization rate is nearly 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1262749: The energy efficiency project included interior and exterior lighting retrofits at a school building. During the desk review and on-site M&V visit, the EM&V

[7] Energy efficiency cost recovery factor

team adjusted the air conditioning type for one of the line items in the LSF calculator from *air-conditioned* to *none*, and the lighting control type for the installed LED exit signs from *occupancy sensors control (OS)* to *none*. Fixture quantities were also corrected for three rooms in the school: from 56 LED tubes claimed to 84, from 27 LED tubes claimed to 24, and from 4 LED tubes claimed to 2. In addition, the EM&V team adjusted wattages for two types of interior fixtures from 14.0 W claimed to 14.5 W and from 21.0 W claimed to 20.5 W using the DLC qualified products list. The TRM allows for wattages in 0.5 increments; therefore, the rated wattages were rounded to the nearest half-watt denomination. Similarly, wattages were also corrected for several exterior screw-in lamps from 11.0 W to 10.5 W. This did not affect the evaluated savings because the canopy lights and outdoor screw-in LEDs did not have the required control devices. Overall, the adjustments resulted in a slight decrease in peak demand and energy savings and realization rates of 99 percent for both kW and kWh.

Participant ID 1264370: The energy efficiency project included interior and exterior lighting retrofits at a school building. During the desk review and on-site M&V visit, the EM&V team adjusted fixture quantities for several interior areas in the school: from 16 LED tubes claimed to 12, from 16 LED tubes claimed to 12, from 32 LED tubes claimed to 34, from 16 LED tubes claimed to 12, and from 68 LED tubes claimed to 34. Quantities were also corrected for exterior fixtures: from 3 LED fixtures claimed to 2 and from 5 LED fixtures claimed to 4. In addition, the EM&V team removed the fixtures of two line items in the LSF calculator per on-site visit findings. Overall, the adjustments resulted in a decrease in peak demand and energy savings and realization rates of 96 percent for both kW and kWh.

Participant ID 1277269: The energy efficiency project included the new construction of interior and exterior lighting at a school building with a sports field. During the desk review and on-site M&V visit, the EM&V team removed the sports field lighting from the interior inventory and adjusted the project building type from *sports arena* to *school/university*. The square footage of the track and field area was also removed from the total facility gross lighted floor area. These corrections drastically decreased peak demand and energy savings. In addition, several fixtures had minor wattage adjustments based on the DLC qualified products list: from 29.0 W claimed to 28.5 W, from 17.0 W claimed to 16.5 W, from 84.0 W claimed to 84.5 W, and from 179.0 W claimed to 178.5 W. The TRM allows for wattages in 0.5 increments; therefore, the rated wattages were rounded to the nearest half-watt denomination. Overall, the corrections resulted in realization rates of 37 percent kW and 39 percent kWh.

Participant ID 1277436: The energy efficiency project included an early replacement of HVAC equipment at a school building. During the desk review and on-site M&V visit, the EM&V team found the pre-retrofit cooling coil type to be an Al/Cu condenser coil instead of the claimed MCHX (microchannel heat exchanger) type. The baseline of the pre-retrofit chiller was adjusted from 194.9 tons claimed to 194.0 tons. In addition, the capacity of the installed chiller was corrected from 190.0 tons claimed to 190.3 tones, based on the submitted performance data and the on-site M&V findings. Overall, the adjustments reduced peak demand and energy savings and resulted in realization rates of 95 percent kW and 98 percent kWh.

Participant ID 1280188: The energy efficiency project included interior and exterior lighting retrofits at a school building. During the desk review, the EM&V team noted that the tracking system did not claim savings from the screw-in light bulbs, which were included in

the calculator. This adjustment resulted in a slight increase in peak demand and energy savings and realization rates of 102 percent for both kW and kWh.

Participant ID 1280525: The energy efficiency project included the installation of an optimization control system and related control points on seven existing chillers and associated pumps and cooling towers at a large hospital. During the desk review, the EM&V team determined that the ex-ante savings calculation was unacceptable. The EM&V team accepted an updated analysis developed by CenterPoint and individuals knowledgeable of the project. The ex-post regression analysis adjusted the updated analysis by creating hourly readings for the time period between June 25, 2019 and July 10, 2019 to match the detail of the pre- and post-data-collection readings. The ex-post calculation also incorporated the temperature readings into the baseline and developed a regression using both load and outdoor air temperature. The corrections resulted in realization rates of 93 percent kW and 128 percent kWh.

Participant ID 1281828: The energy efficiency project included the new installation of interior lighting, oil-cooling units on servers (thus eliminating the need for server fans), and water-cooled chillers at a data center. The project was smaller than the original design previously reviewed by the EM&V team due to the removal of the uninterruptible power supply (UPS). During the desk review, the EM&V team adjusted the lighting portion of the project. The lighting custom savings calculation was reduced because the HVAC interactive effects identified in the lighting calculation were also included in the cooling savings. In addition, the EM&V team determined that removing UPSs from the design is not an energy efficiency improvement but rather a design modification. The EM&V team asked for further documentation and justification regarding the design decision for further consideration, but none was provided in the final documentation. Overall, the corrections resulted in a decrease in peak demand and energy savings and realization rates of 87 percent for both kW and kWh.

Participant ID 1287275: The energy efficiency project included the installation of an ENERGY STAR® roof at a school building. During the desk review and on-site M&V visit, the EM&V team adjusted the installed roof area from 112,800 claimed to 111,280 square feet. This correction resulted in realization rates of 99 percent for both kW and kWh.

Participant ID 1288268: The energy efficiency project included interior lighting retrofits and an early replacement of HVAC equipment at a school building. During the desk review and on-site M&V visit, the EM&V team used the regression analysis equations derived from monitoring to identify the peak demand (kW) from the top 20 PDPF hours from the TRM for climate zone 3. This increased the savings over the assumed average kW from summer because it eliminated the June and July months for the school peak demand calculation. This correction resulted in realization rates of 191 percent kW and 100 percent kWh.

Participant ID 1288286: The energy efficiency project included the new construction of interior lighting with controls and exterior lighting at a school building. During the desk review, the EM&V team adjusted the building type from *performing arts theater* to *school/university*. This adjustment reduced savings from the interior lighting portion of the project. Lighting controls, exterior lighting, and HVAC savings remained the same. Overall, the corrections drastically reduced peak demand and energy savings and resulted in realization rates of 36 percent kW and 37 percent kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for 20 projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications or AHRI certifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment, which are significant efforts by the utility to verify equipment conditions and quantities. Partial documentation was provided for one custom project that did not provide a clear description of the methodologies used to calculate savings and lacked inspection notes and photos. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of "good."

4.3.2 Large Commercial Standard Offer Program (SOP)

Program contribution to Portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
4.6%	8,999	8,999	100.0%	26.0%	55,504,907	55,504,907	100.0%	Good

Completed desk reviews*	On-site M&V
17	9

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Large Commercial SOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for eight projects. Six projects had adjustments of less than five percent, and two projects had adjustments greater than five percent compared to the originally claimed savings. CenterPoint accepted the evaluated results and matched the claimed savings to those of the evaluations for the projects with significant adjustments, and therefore, the final program realization rate is nearly 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1196336: The energy efficiency project included exterior lighting retrofits at a parking lot. During the desk review and on-site M&V visit, the EM&V team adjusted the air-conditioning type from *air-conditioned* to *none*. The non-operational fixtures ratio in this project was over 10 percent. CenterPoint's calculator only applies this adjustment to the individual line item; however, the TRM requires that the adjustment be applied to all exterior inventory. In addition, the quantity of the 225 W LED pole light fixtures installed was adjusted for one area of the parking lot from four claimed to two per on-site M&V findings. Overall, the corrections resulted in realization rates of 100 percent kW and 105 percent kWh.

Participant ID 1196339: The energy efficiency project included exterior lighting retrofits at a retail building. During the desk review, the EM&V team adjusted the pre- and post-retrofit quantities for the 42 W fluorescent wall pack replacement from two and one, respectively (claimed), to four and three, respectively. This correction resulted in a negligible increase in peak demand and energy savings and realization rates of 100 percent for both kW and kWh.

Participant ID 1196353: The energy efficiency project included interior and exterior lighting retrofits at a manufacturing facility. During the desk review, the EM&V team used the LSF calculator v2019.1 to calculate savings because the project interior lighting fixtures exceeded the ten percent threshold for non-operational fixtures, and the CenterPoint calculator does not follow the TRM for that specific case. The LSF calculator adjusted the savings to apply the TRM-intended reduction for the interior lighting portion of the project. Minor baseline equipment wattages and post-retrofit fixtures wattages were also applied. In addition, the EM&V team corrected the wattages for several fixtures from 147.0 W claimed to 147.5 W and from 60.0 W claimed to 61.0 W based on the DLC qualified products list. Overall, the adjustments increased peak demand and energy savings and resulted in realization rates of 105 percent kW and 106 percent kWh.

Participant ID 1196369: The energy efficiency project included interior and exterior lighting retrofits at a manufacturing facility. During the desk review and on-site M&V visit, the EM&V team adjusted the quantities of the installed interior LED fixtures for two line items in the calculator from 67 claimed to 63 and from 27 claimed to 28. The installed fixture control type for those two line items was corrected from *none* to *occupancy sensor control*. Overall, the adjustments increased peak demand and energy savings and resulted in realization rates of 110 percent for both kW and kWh.

Participant ID 1196376: The energy efficiency project included exterior lighting retrofits at a parking lot. During the desk review and on-site M&V visit, the EM&V team corrected several fixtures' wattage from 299.0 W claimed to 299.5 W based on the DLC qualified products list. The TRM allows for wattages in 0.5 increments; therefore, the rated wattages were rounded to the nearest half-watt denomination. The adjustment resulted in a negligible decrease in energy savings and realization rates of 100 percent for both kW and kWh.

Participant ID 1213712: The energy efficiency project included interior lighting retrofits at a non-refrigerated warehouse with offices. During the desk review and on-site M&V visit, the EM&V team removed the occupancy sensor controls for three line items in the savings calculator and confirmed that the rest of indoor lighting is controlled by relay switches. The fixture quantity was also adjusted for one line item in the calculator from 85 three-lamp troffer fixtures claimed to 86, per on-site M&V findings. Overall, the adjustments resulted in a slight increase in peak demand and energy savings and realization rates of 101 percent for both kW and kWh.

Participant ID 1213756: The energy efficiency project included the new construction of interior lighting, exterior lighting, and HVAC equipment at a warehouse building. During the desk review, the EM&V team adjusted the wattages of five different fixtures to the nearest half-watt denomination using DLC or ENERGY STAR® qualified products lists since the 2019 version of the TRM allows for wattages in 0.5 increments. The wattage was also corrected for other fixtures from 12.0 W to 13.0 W. In addition, 13 fixtures were removed from the savings calculation because they were found to be non-qualified. Overall, the

adjustments resulted in a negligible decrease in peak demand and energy savings and realization rates of 100 percent for both kW and kWh.

Participant ID 1213763: The energy efficiency project included interior lighting retrofits at a 24-hour supermarket. During the desk review, the EM&V team corrected the wattage of several fixtures from 73.3 W claimed to 73.5 W to match the TRM-specified increments. The adjustment resulted in a negligible decrease in peak demand and energy savings and realization rates of 100 percent for both kW and kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for 16 projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications or AHRI certifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment, which are significant efforts by the utility to verify equipment conditions and quantities. Partial documentation was provided for one lighting project that lacked certifications and invoices. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of "good."

4.3.3 Retro-Commissioning Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
0.4%	861	861	100.0%	2.1%	4,458,399	4,458,399	100.0%	Good

Completed desk reviews*	On-site M&V
1	1

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Retro-commissioning MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above. The EM&V team did not suggest any savings adjustments, and therefore, the final program realization rate is 100 percent.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for the project that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications, equipment specifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment, which are significant efforts by the utility to verify equipment conditions and

quantities. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of “good.”

4.3.4 Multifamily Market Transformation Program (MTP)

Market-Rate

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
0.1%	226	226	100.0%	0.4%	867,075	867,075	100.0%	Good

Hard-to-Reach

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
0.1%	130	130	100.0%	0.3%	584,614	584,614	100.0%	Good

Completed desk reviews*	On-site M&V
10	0

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Multifamily MTP evaluation efforts focused on desk reviews. The number of sampled and completed desk reviews for this program is listed above.

The EM&V team did not make any adjustments to this program. Overall, the EM&V team assessed ex-ante claimed energy and demand savings across a sample of projects by completing desk reviews to check that measure data collected by contractors on forms aligned correctly with that in the tracking system.

Desk reviews were completed for 10 projects and resulted in desk review realization rates of 100 percent for both demand and energy savings.

Documentation Score

The EM&V team was able to verify all key inputs and assumptions (e.g., pre- and post-condition) for the sampled boiler project. For direct installs such as low-flow showerheads and LEDs, the EM&V team was able to verify key inputs and assumptions with the documentation provided. Because sufficient documentation was provided across all the reviewed projects, the EM&V team assigned a program documentation score of “good.”

4.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

4.4.1 Large Commercial Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
63.8%	123,670	123,670	100.0%	0.3%	742,022	742,022	100.0%	Good

Completed desk reviews*	On-site M&V
N/A	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

The EM&V team evaluated the Large Commercial Load Management SOP by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments at the ESI ID level. Load management events occurred on the following dates and times:

- July 10, 2019, from 2:00 p.m. to 5:00 p.m.
- August 12, 2019, from 3:30 p.m. to 6:30 p.m.

The EM&V team received the interval meter data as well as spreadsheets detailing the CenterPoint calculated savings results for the event and each ESI ID. In reviewing individual meter savings differences, the EM&V team found that, although CenterPoint set savings to zero in cases where the calculation methodology produced negative savings, that was not reflected in CenterPoint's claimed savings. Per TRM 6.0, in cases where the savings algorithm produces negative savings, the negative savings can be set to zero. The EM&V team informed CenterPoint about the discrepancies between their load management savings calculation and their claimed savings, and CenterPoint notified us that the final claimed savings will be adjusted to match their load management savings calculation and the evaluated savings. The table above shows both the EM&V team and CenterPoint's calculated kW and kWh savings.

Evaluated savings for the Large Commercial Load Management SOP are 123,670 kW and 742,022 kWh. The realization rate for both kW and kWh is 100 percent.

4.4.2 Residential Demand Response Program

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
9.2%	17,817	17,818	100.0%	0.1%	106,905	106,906	100.0%	Good

Completed desk reviews*	On-site M&V
N/A	N/A

*The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

The EM&V team evaluated the Residential Demand Response Program by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments at the ESI ID level. Load management events occurred on the following dates and times:

- July 10, 2019, from 2:00 p.m. to 5:00 p.m.
- August 12, 2019, from 3:30 p.m. to 6:30 p.m.

The EM&V team received the interval meter data as well as spreadsheets detailing the CenterPoint calculated savings results for the event and each ESI ID. After applying the “high 3 of 5 baseline” calculation method, the EM&V team was able to calculate savings for all participating sites but one site that had load data for only four days. The EM&V applied the average savings value to that site, which resulted in an insignificant increase in kW savings. The kWh savings were calculated by multiplying the kW savings by the total number of event hours. The table above shows both the EM&V team and CenterPoint’s calculated kW and kWh savings.

Evaluated savings for the Residential Demand Response Program are 17,818 kW and 106,905 kWh. The realization rate for both kW and kWh is 100 percent.

4.5 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 18 provides a summary of claimed savings for CenterPoint's programs in PY2019 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2019 tracking data provided to the EM&V team for the EM&V database.

Table 18. PY2019 Claimed Savings (Tracking-System-Only Evaluated Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Advanced Lighting Commercial	0.1%	247	247	100.0%	0.6%	1,347,321	1,347,321	100.0%
REP (Commercial CoolSaver)	0.3%	584	584	100.0%	0.7%	1,467,968	1,467,968	100.0%
Residential & SC SOP	0.2%	396	396	100.0%	0.6%	1,329,658	1,329,658	100.0%
CenterPoint Energy High Efficiency Homes MTP	7.2%	13,999	13,999	100.0%	13.2%	28,280,400	28,280,400	100.0%
Advanced Lighting Residential	2.4%	4,683	4,683	100.0%	12.0%	25,599,104	25,599,104	100.0%
REP (CoolSaver & Efficiency Connection) (Res)	1.8%	3,509	3,509	100.0%	4.4%	9,347,520	9,347,520	100.0%
Hard-to-Reach SOP	0.7%	1,357	1,357	100.0%	0.9%	1,940,952	1,940,952	100.0%
Targeted Low-Income MTP (Agencies in Action)	2.2%	4,329	4,329	100.0%	3.1%	6,710,433	6,710,433	100.0%
Smart Thermostat Program (Pilot)	0.0%	0	0	n/a	1.1%	2,389,960	2,389,960	100.0%

4.6 SUMMARY OF LOW PRIORITY EVALUATION PROGRAMS

Table 19 provides a summary of claimed savings for CenterPoint's low evaluation priority programs in PY2019, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2019 tracking data provided to the EM&V team for the EM&V database.

Table 19. PY2019 Claimed Savings (Low Evaluation Priority Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Residential Pool Pump & A/C Distributor MTP	1.8%	3,469	3,469	100.0%	4.6%	9,914,539	9,914,539	100.0%

5.0 EL PASO ELECTRIC COMPANY IMPACT EVALUATION RESULTS

This section presents the evaluated savings and cost-effectiveness results for El Paso Electric Company's (El Paso Electric) energy efficiency portfolio. The key findings are summarized first, followed by details for each program in the portfolio that had a high or medium evaluation priority. Finally, a list of the low evaluation priority for which claimed savings were verified through the EM&V database are included.

5.1 KEY FINDINGS

5.1.1 Evaluated Savings

El Paso Electric's evaluated savings for PY2019 were 19,424 in demand (kW) and 24,819,876 in energy (kWh) savings. The overall kW and kWh portfolio realization rates are approximately 100 percent. El Paso Electric was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (Table 23), which also supported healthy realization rates.

Table 20 shows the claimed and evaluated demand savings for El Paso Electric's portfolio and broad customer sector/program categories.

Table 20. El Paso Electric PY2019 Claimed and Evaluated Demand Savings

Level of analysis	Percentage portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Precision at 90% confidence
Total portfolio	100.0%	19,424	19,424	100.0%	0.1%
Commercial	21.4%	4,153	4,152	100.0%	0.3%
Residential	10.6%	2,062	2,062	100.0%	0.0%
Load management*	59.1%	11,473	11,475	100.0%	N/A
Pilot	8.9%	1,736	1,736	100.0%	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Table 21 shows the claimed and evaluated energy savings for El Paso Electric's portfolio and broad customer sector/program categories for PY2019.

Table 21. El Paso Electric PY2019 Claimed and Evaluated Energy Savings

Level of analysis	Percentage portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Precision at 90% confidence
Total portfolio	100.0%	24,825,788	24,819,876	100.0%	0.2%
Commercial	80.9%	20,078,411	20,072,503	100.0%	0.3%
Residential	18.9%	4,685,464	4,685,464	100.0%	0.0%
Load management*	0.1%	17,209	17,212	100.0%	N/A
Pilot	0.2%	44,705	44,698	100.0%	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Program-level realization rates are discussed in the detailed findings sub-sections. However, it is important to note that these results should only be viewed qualitatively due to the small sample sizes at the utility program level.

In program-level realization rates, we have also included a program documentation score of good, fair, or limited, as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent to 89 percent of the evaluated savings estimates received a score of good or fair. A score of "limited" was given if less than 70 percent of savings received a score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs or high savings programs have been identified.

El Paso Electric received a "Good" program documentation score for all evaluated programs in 2019.

5.1.2 Cost-Effectiveness Results

El Paso Electric's overall portfolio had a cost-effectiveness score of 3.2.

The more cost-effective programs were Large C&I Solutions MTP and Texas SCORE MTP. The less cost-effective programs were Load Management SOP and Demand Response Pilot Program. The Demand Response Pilot Program did not pass cost-effectiveness.

The lifetime cost of evaluated savings was $0.010 per kWh and $15.95 per kW.

Table 22. El Paso Electric Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total Portfolio	**3.2**	**3.2**	**2.9**
Commercial	**4.3**	**4.3**	**3.9**
Small Commercial Solutions MTP	3.2	3.2	3.0
Large C&I Solutions MTP	4.9	4.9	4.3
Texas SCORE MTP	4.2	4.2	3.8
Residential	**2.1**	**2.1**	**1.9**
Residential Solutions MTP	2.8	2.8	2.5
LivingWise MTP	2.1	2.1	1.7
Texas Appliance Recycling MTP	1.8	1.8	1.4
Hard-to-Reach Solutions MTP	1.8	1.8	1.8
Load Management	**1.6**	**1.6**	**1.6**
Load Management SOP	1.6	1.6	1.6
Pilot	**0.7**	**0.7**	**0.7**
Demand Response Pilot Program	0.7	0.7	0.7

5.2 CLAIMED SAVINGS ADJUSTMENTS

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 23 summarizes claimed savings adjustments recommended by the EM&V team. All commercial adjustments were made prior to the EEPR filing on April 1, 2020. Realization rates assume the following adjustments will be included in El Paso Electric's May 1 filing.

Table 23. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF[8] Filing)

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Large C&I Solutions MTP	-12.2	-57,210.1
Small Commercial Solutions MTP	-0.8	-2,930.0
Texas SCORE MTP	2.8	21,930.0
Total	**-10.2**	**-38,210.1**

[8] Energy efficiency cost recovery factor

5.3 DETAILED FINDINGS—COMMERCIAL (MEDIUM EVALUATION PRIORITY)

5.3.1 Large Commercial and Industrial (C&I) Solutions Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
12.3%	2,395	2,395	100.0%	46.3%	11,493,121	11,493,134	100.0%	Good

Completed desk reviews*	On-site M&V
6	4

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Large C&I Solutions MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for three projects. Two projects had adjustments of less than five percent, and one project had adjustments greater than five percent compared to the original claimed savings. El Paso Electric accepted the evaluated results and matched the claimed savings to those of the evaluations for all projects, and therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1200972: The energy efficiency project included the new construction of chillers and heat pumps at a healthcare facility. During the desk review and on-site M&V visit, the EM&V team verified the nameplate information, type, and quantities of the installed HVAC equipment. The quantity of the variable refrigerant flow (VRF) heat pumps with a cooling capacity of 48,000 BTUH was adjusted from two to one per on-site M&V visit findings. This adjustment decreased peak demand and energy savings and resulted in realization rates of 99 percent kW and 98 percent kWh.

Participant ID 1201087: The energy efficiency project included interior and exterior lighting retrofits at a retail building. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed exterior fixtures using the DLC qualified products list from 40.0 W claimed to 39.5 W. The LSF calculator allows for wattages in 0.5 increments; therefore, the rated wattage was adjusted to the closest wattage in the LSF calculator. The wattage adjustment resulted in a negligible decrease in peak demand and energy savings and realization rates of 100 percent kW and kWh.

Participant ID 1241520: The energy efficiency project included the installation of a new air compressor at a manufacturing facility. During the desk review and on-site M&V visit, the EM&V team used the savings methodology of the stipulated analysis from Volume 4 of the TRM V6.0 to determine the energy savings because the documentation did not include

pre-install energy logging of the air compressor. Changing the calculation resulted in a large adjustment in peak demand and energy savings and realization rates of 39 percent kW and 44 percent kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for most projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications and AHRI certifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment, which are significant efforts by the utility to verify equipment conditions and quantities. Partial documentation was provided for two projects: one lighting project lacked some QPL certifications, and one custom M&V project was well defined and documented but lacked an explanation of reasons for the utility's savings or incentives cap. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of Good.

5.3.2 Small Commercial Solutions Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
4.2%	818	818	100.0%	13.0%	3,232,821	3,232,821	100.0%	Good

Completed desk reviews*	On-site M&V
8	4

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Small Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for five projects. Four projects had adjustments of less than five percent, and one project had adjustments greater than five percent compared to the original claimed savings. El Paso Electric accepted the evaluated results and matched the claimed savings to those of the evaluations for all projects with significant adjustments, and therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1200210: The energy efficiency project included interior and exterior lighting retrofits at a non-refrigerated warehouse. During the desk review and on-site M&V visit, the EM&V team adjusted the building type from "office" to "warehouse non-refrigerated" based on the area usage. The air conditioning type was also adjusted to "none" for the building dock. In addition, the EM&V team corrected wattages for several installed fixtures

using the DLC and ENERGY STAR® qualified products lists: from 36.0 W claimed to 34.5 W, from 15.0 W claimed to 18.0 W, from 25.0 W claimed to 25.5 W, and from 10.0 W claimed to 10.5 W. The LSF calculator allows for wattages in 0.5 increments; therefore, for some fixtures, the rated wattages were adjusted to the closest wattages in the LSF calculator. Overall, these corrections reduced peak demand and energy savings and resulted in realization rates of 94 percent kW and 95 percent kWh.

Participant ID 1200226: The energy efficiency project included interior and exterior lighting retrofits at a school building. During the desk review, the EM&V team adjusted the wattages for several installed fixtures from 140.0 W claimed to 141.0 W (interior) and from 150.0 W claimed to 144.5 W (exterior) using the DLC qualified products list. The qualification of several exterior fixtures was also corrected from "DLC" to "non-qualified." Overall, these adjustments resulted in a negligible increase in peak demand and energy savings and realization rates of 100 percent kW and kWh.

Participant ID 1200245: The energy efficiency project included exterior lighting retrofits at a non-air-conditioned parking garage. During the desk review and on-site M&V visit, the EM&V team corrected the number of fixtures installed in the stairs area of the garage from four to three LED tubes. This minor quantity adjustment resulted in a negligible increase in peak demand and energy savings and realization rates of 100 percent kW and kWh.

Participant ID 1200257: The energy efficiency project included exterior lighting retrofits at a retail strip mall building. During the desk review, the EM&V team adjusted wattages for several installed fixtures using the DLC qualified products list: from 300.0 W claimed to 299.5 W, from 60.0 W claimed to 59.0 W, from 55.0 W claimed to 56.5 W, and from 40.0 W claimed to 38.5 W. The LSF calculator allows for wattages in 0.5 increments; therefore, for some fixtures, the rated wattages were adjusted to the closest wattages in the LSF calculator. The wattage corrections resulted in a negligible increase in energy savings and realization rates of 100 percent kW and kWh.

Participant ID 1236293: The energy efficiency project included interior and exterior lighting retrofits at a non-refrigerated warehouse. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed exterior fixtures from 119.5 W claimed to 119.0 W using the DLC qualified products list. The LSF calculator allows for wattages in 0.5 increments; therefore, the rated wattage was adjusted to the closest wattage in the LSF calculator. The wattage adjustment resulted in a negligible increase in energy savings and realization rates of 100 percent kW and kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for most projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications and AHRI certifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment, which are significant efforts by the utility to verify equipment conditions and quantities. Partial documentation was provided for two projects: one lighting project lacked specification sheets, QPL certifications, and invoices, and another lighting project lacked the pre- and post- savings calculators, invoices, and some specification sheets. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of Good.

5.3.3 Texas SCORE Market Transformation Program (MTP)

Program contribution to Portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
4.8%	940	939	99.8%	21.6%	5,352,469	5,346,548	99.9%	Good

Completed desk reviews*	On-site M&V
4	1

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Texas SCORE MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for two projects. One project had adjustments of less than five percent, and one project had adjustments greater than five percent compared to the original claimed savings. El Paso Electric accepted the evaluated results and matched the claimed savings to those of the evaluations for all projects with significant adjustments, and therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1241943: The energy efficiency project included interior and exterior lighting retrofits with controls at a parking garage. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed fixtures from 54.0 W claimed to 54.5 W and from 117.0 W claimed to 117.5 W using the DLC qualified products list. The LSF calculator allows for wattages in 0.5 increments; therefore, the rated wattages were adjusted to the closest wattages in the LSF calculator. In addition, the control types were adjusted for all interior equipment from “none” to “occupancy sensor” and for all exterior lighting equipment from “timeclock” to “photocell” per on-site M&V visit findings. Overall, these corrections increased the peak demand and energy savings and resulted in realization rates of 105 percent kW and 106 percent kWh.

Participant ID 1290093: The energy efficiency project included interior and exterior lighting retrofits at a school building. During the desk review, the EM&V team adjusted wattages for several installed fixtures using the DLC qualified products list: from 40.0 W claimed to 39.0 W, from 40.0 W claimed to 39.5 W, and from 87 W claimed to 87.5 W. The LSF calculator allows for wattages in 0.5 increments; therefore, for some fixtures, the rated wattages were adjusted to the closest wattages in the LSF calculator. The wattage corrections resulted in a negligible increase in energy savings and realization rates of 100 percent kW and kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for all projects that had desk reviews completed

because sufficient documentation was provided for the sites. The project documentation included invoices, QPL qualifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of the existing and new lighting types, which are significant efforts by the utility to verify equipment conditions and quantities. Therefore, the EM&V team assigned a program documentation score of Good.

5.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

5.4.1 Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
59.1%	11,473	11,475	100.0%	0.1%	17,209	17,212	100.0%	Good

Completed desk reviews*	On-site M&V
N/A	N/A

*The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

The EM&V team evaluated the El Paso Electric Load Management SOP by applying the "high 5 of 10 baseline" TRM calculation methodology to interval meter data. The meter data was supplied in 30-minute increments at the meter level. A single scheduled load management event occurred in PY2019 on June 14, 2019, from 1:00 p.m. to 2:30 p.m.

The EM&V team received the interval meter data as well as spreadsheets detailing the El Paso Electric calculated baseline load, event load, and savings results for each event and meter. The EM&V team reviewed the data for the 13 sponsors across 23 sites. All sites participated in the scheduled event. After the EM&V team applied the "high 5 of 10 baseline" calculation method, it was found that the evaluated savings matched the savings El Paso provided for all but one site. When selecting baseline days using the "high 5 of 10" method for that site, six days were selected as baseline days instead of the five highest loads and closest to the event, as recommended by the TRM 6.0 Volume 4. The adjustment in savings calculation resulted in an insignificant increase in kW. The kWh savings were calculated by multiplying the kW savings by the total number of event hours. The table above shows both the EM&V team and EPE's calculated kW and kWh savings.

Evaluated savings for the El Paso Electric Load Management program are 11,475 kW and 17,212 kWh. The realization rate for both kW and kWh is 100 percent.

5.5 DETAILED FINDINGS—PILOT PROGRAMS (MEDIUM EVALUATION PRIORITY)

5.5.1 Demand Response Pilot Program

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
8.9%	1,736	1,736	100.0%	0.2%	44,705	44,698	100.0%	Good

Completed desk reviews*	On-site M&V
N/A	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

The EM&V team evaluated the El Paso Electric Demand Response pilot program by applying the deemed savings value from the TRM. The meter data was supplied in 30-minute increments at the meter level. Demand-response events in PY2019 occurred on the following dates and times:

- June 26, 2019, from 3:00 p.m. to 5:00 p.m. (unscheduled)
- July 8, 2019, from 3:00 p.m. to 5:00 p.m. (unscheduled)
- July 12, 2019, from 3:00 p.m. to 5:00 p.m. (unscheduled)
- July 18, 2019, from 3:00 p.m. to 5:00 p.m. (unscheduled)
- August 5, 2019, from 3:00 p.m. to 6:00 p.m. (unscheduled)
- August 6, 2019, from 3:00 p.m. to 6:00 p.m. (unscheduled)
- August 29, 2019, from 3:00 p.m. to 5:00 p.m. (unscheduled)
- September 3, 2019, from 3:00 p.m. to 5:00 p.m. (unscheduled)
- September 11, 2019, from 3:00 p.m. to 5:00 p.m. (unscheduled)
- September 18, 2019, from 3:00 p.m. to 5:00 p.m. (unscheduled)
- September 20, 2019, from 3:00 p.m. to 5:00 p.m. (unscheduled)
- September 23, 2019, from 3:00 p.m. to 5:00 p.m. (unscheduled)

The EM&V team received a list of participants in the program and event summary documentation from both program implementers (Nest and Bring Your Own Thermostat). The EM&V team was able to gather the necessary information from the participants' list and summary documentation and applied the new deemed savings value from TRM version 7.0, following El Paso Electric's calculation approach.

The provided participants' list included information about the participation status of all meters: full participation, partial participation, or opt outs. Meters that opted out from the program were excluded from the savings calculation. Partial participants included meters that were offline or were in an incompatible mode for at least part of the event. These meters were included in the savings calculation even when participating for less than 50 percent of the event duration. Per TRM 7.0, participants are defined as smart thermostats, which participated no less than 50

percent of the time during the total event duration. The EM&V team recognizes that excluding meters that opted out during the event (even after participating for more than 50 percent of the event) was a conservative approach, but we recommend excluding the partial participants who participated in the event for less than 50 percent of the event duration, per TRM guidance. For PY2019, excluding these partial participants resulted in a negligible decrease in kW savings (3 kW). Since TRM 7.0 is effective starting in 2020, the EM&V accepted the savings calculated by El Paso Electric. A negligible difference in kWh is attributed to rounding practices during calculations.

The EM&V team will continue discussing the savings calculation with El Paso Electric to ensure that there is a clear understanding of the TRM guidance and identify areas in the TRM that need updates to avoid any confusion in the future.

Evaluated savings for the El Paso Electric Demand Response program are 1,736 kW and 44,698 kWh. The realization rate for both kW and kWh is 100 percent.

5.6 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 24 provides a summary of claimed savings for El Paso Electric's programs in PY2019 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2019 tracking data provided to the EM&V team for the EM&V database.

The EM&V team noted several fields that were not provided to support TRM savings calculations for several measures in the Residential and Hard-to-Reach Solutions MTPs. These fields include:

- heating type,
- cooling type,
- roof reflectance,
- steep/low slope,
- existing ceiling/roof deck insulation type,
- house square feet.

Table 24. PY2019 Claimed Savings (Tracking-System-Only Evaluated Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Residential Solutions MTP	3.1%	601	601	100.0%	4.9%	1,228,399	1,228,399	100.0%
Hard-to-Reach Solutions MTP	4.0%	781	781	100.0%	4.5%	1,112,828	1,112,828	100.0%
Texas Appliance Recycling MTP	0.6%	107	107	100.0%	3.5%	868,560	868,560	100.0%
LivingWise MTP	2.9%	572	572	100.0%	5.9%	1,475,677	1,475,677	100.0%

6.0 ENTERGY TEXAS, INC. IMPACT EVALUATION RESULTS

This section presents the evaluated savings and cost-effectiveness results for Entergy Texas, Inc.'s (Entergy) energy efficiency portfolio. The key findings are summarized first, followed by details for each program in the portfolio that had a high or medium evaluation priority. Finally, a list of the low evaluation priority for which claimed savings were verified through the EM&V database are included.

6.1 KEY FINDINGS

6.1.1 Evaluated Savings

Entergy's evaluated savings for PY2019 were 20,993 in demand (kW) and 44,586,227 in energy (kWh) savings. The overall kW and kWh portfolio realization rates are approximately 100 percent. Entergy was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (Table 28), which also supported healthy realization rates.

Table 25 shows the claimed and evaluated demand savings for Entergy's portfolio and broad customer sector/program categories.

Table 25. Entergy PY2019 Claimed and Evaluated Demand Savings

Level of analysis	Percentage portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Precision at 90% confidence
Total portfolio	100.0%	20,993	20,993	100.0%	0.0%
Commercial	26.0%	5,451	5,451	100.0%	0.0%
Residential	37.1%	7,794	7,794	100.0%	0.0%
Load management*	36.9%	7,747	7,747	100.0%	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Table 26 shows the claimed and evaluated energy savings for Entergy's portfolio and broad customer sector/program categories for PY2019.

Table 26. Entergy PY2019 Claimed and Evaluated Energy Savings

Level of analysis	Percentage portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Precision at 90% confidence
Total portfolio	100.0%	44,586,227	44,586,227	100.0%	0.0%
Commercial	70.4%	31,401,593	31,401,593	100.0%	0.0%
Residential	29.4%	13,110,881	13,110,881	100.0%	0.0%
Load management*	0.2%	73,753	73,753	100.0%	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Program-level realization rates are discussed in the detailed findings sub-sections. However, it is important to note that these results should only be viewed qualitatively due to the small sample sizes at the utility program level.

In program-level realization rates, we have also included a program documentation score of good, fair, or limited, as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent to 89 percent of the evaluated savings estimates received a score of good or fair. A score of "limited" was given if less than 70 percent of savings received a score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs or high savings programs have been identified. Entergy received good documentation scores for all of their evaluated programs in PY2019.

6.1.2 Cost-Effectiveness Results

Entergy's overall portfolio had a cost-effectiveness score of 3.2.

The more cost-effective programs were Commercial Solutions MTP and Residential Solutions. The less cost-effective programs were Hard-to-Reach SOP and Load Management SOP. All of Entergy's programs passed cost-effectiveness in 2019.

The lifetime cost of evaluated savings was $0.009 per kWh and $13.84 per kW.

Table 27. Entergy Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total Portfolio excluding low-income programs	**3.2**	**3.2**	**2.8**
Commercial	**4.5**	**4.5**	**4.0**
Commercial Solutions MTP	4.5	4.5	4.0
Residential	**2.4**	**2.4**	**2.0**
Residential SOP	2.3	2.3	2.0
Residential Solutions	2.8	2.8	1.9
Hard-to-Reach SOP	2.0	2.0	2.0
Load Management	**1.7**	**1.7**	**1.7**
Load Management SOP	1.7	1.7	1.7

6.2 CLAIMED SAVINGS ADJUSTMENTS

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 28 summarizes claimed savings adjustments recommended by the EM&V team. Realization rates assume the following adjustments will be included in Entergy's May 1 filing.

Table 28. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF[9] Filing)

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial Solutions MTP	6.30	10,020.00
Total	**6.30**	**10,020.00**

[9] Energy efficiency cost recovery factor

6.3 DETAILED FINDINGS—COMMERCIAL (MEDIUM EVALUATION PRIORITY)

6.3.1 Commercial Solutions Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
26.0%	5,451	5,451	100.0%	70.4%	31,401,593	31,401,593	100.0%	Good

Completed desk reviews*	On-site M&V
14	7

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for five projects. Four projects had adjustments of less than five percent, and one project had adjustments greater than five percent compared to the original claimed savings. Entergy accepted the evaluated results and matched the claimed savings to those of the evaluations for all projects, and therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1200760: The energy efficiency project included a new energy management system (EMS) for optimized HVAC system control at an army reserve building. During the desk review and on-site M&V visit, the EM&V team adjusted the savings calculation approach for the peak kW to match the peak demand hours in the TRM. The amount of savings claimed for this project appears to exceed the savings reduction estimate achieved by EMS upgrade alone; therefore, it is expected that the installer also completed additional commissioning type measures as part of the install. Defining these additional commissioning activities will improve the regression analysis by helping with the correlation of the equations to operations between the pre-install and post-install analysis. Based on the information available in the documentation and during the desk review, it is determined that the savings are acceptable. Overall, the change in the savings calculation approach resulted in realization rates of 103 percent kW and 100 percent kWh.

Participant ID 1200998: The energy efficiency project included interior and exterior lighting and motor retrofits and at a hotel building. During the desk review, the EM&V team adjusted the lighting portion of the project. For interior lighting, 69 fixtures were disqualified since no qualification certificates were provided and could not be found. For exterior lighting, the replacement of metal halide fixtures with LED fixtures for the building façade and dock was added to the savings calculation based on provided invoices and post-retrofit photos. This change, however, resulted in a negligible increase in peak demand and energy savings because the LED fixtures installed for the building façade were non-

qualified. Overall, the adjustments resulted in realization rates of 101 percent kW and 100 percent kWh.

Participant ID 1201004: The energy efficiency project included interior and exterior lighting retrofits at a non-refrigerated warehouse. During the desk review, the EM&V team updated the submitted Phase 1 and Phase 2 LSF calculators from v2018.5 to v2019.1 and incorporated post-inspection notes that were not included in the calculations. For the Phase 1 LSF calculator, the fixture code and wattage were adjusted for several LED tubes from "LED037-FIXT" to "LED025-TUBE." The qualification for these LED tubes was also corrected from "DLC" to "Ltg facts." For the Phase 2 LSF calculator, the EM&V team added a few line items to the calculator and removed others according to post-inspection notes. The pre-retrofit fixture code and quantity were adjusted for one line item in the calculator from four "CF32/1-SCRW" (screw-in lamps) to two "F42GLL" (2-T8 lamps). The fixture quantity and wattage were accordingly adjusted for the post-retrofit fixtures based on the provided documentation from four 22 W LED fixtures to two 28 W LED fixtures. Overall, the adjustments resulted in a decrease in energy savings and realization rates of 100 percent kW and 98 percent kWh.

Participant ID 1201015: The energy efficiency project included interior and exterior lighting retrofits at an office building. During the desk review and on-site M&V visit, the EM&V team corrected the fixture quantity in one of the offices from two to four LED fixtures. This adjustment resulted in a small decrease in peak demand and energy savings and realization rates of 98 percent kW and 99 percent kWh.

Participant ID 1201029: The energy efficiency project included interior and exterior lighting retrofits at a retail building. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed fixtures from 18 W claimed to 16.5 W using the ENERGY STAR® qualified products list. Other pre-retrofit and post-retrofit fixtures were added to the LSF calculator in addition to occupancy sensors per on-site M&V visit findings. Some of these fixtures and occupancy sensors were removed from the savings calculator by earlier inspection visits. These items were put back into the LSF calculator and represented in total savings. The increase in peak demand and energy savings from the occupancy sensors were added to the LED lighting measure savings because the LED controls measure does not exist in the evaluation tracking system. Overall, the adjustments resulted in realization rates of 123 percent kW and 132 percent kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for most projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications and AHRI certifications, pre- and post-inspection notes, the project savings calculators, and photographic documentation of existing and new equipment, which are significant efforts by the utility to verify equipment conditions and quantities. Partial documentation was provided for two lighting projects that lacked specification sheets and QPL certifications. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of Good.

6.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

6.4.1 Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
36.9%	7,747	7,747	100.0%	0.2%	73,753	73,753	100.0%	Good

Completed desk reviews*	On-site M&V
N/A	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

The EM&V team evaluated Entergy's Load Management program by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments. Load management events in PY2019 occurred on the following dates and times:

- June 13, 2019, from 2:00 p.m. to 3:00 p.m. (scheduled)
- June 14, 2019, from 2:00 p.m. to 3:00 p.m. (scheduled)
- August 13, 2019, from 3:00 p.m. to 4:00 p.m. (unscheduled)
- August 15, 2019, from 1:00 p.m. to 5:00 p.m. (unscheduled)
- August 16, 2019, from 1:00 p.m. to 5:00 p.m. (unscheduled)

The EM&V team received interval meter data as well as a spreadsheet that summarized the event-level savings for the eight sponsors across 53 sites. All sites participated in one scheduled event that was used as a test event (15 sites participated in the event on June 13, 2019, and 38 sites participated in the event on June 14, 2019). Several sites did not have any load data associated with them for at least one of the unscheduled events as they did not participate in those events (8–12 sites per event). Two of those sites had a meter changed after the test event and, therefore, did not have load data for all unscheduled events.

To calculate savings at the site level, Entergy averaged the kW reductions for each site, whether or not the site participated in all events (one scheduled event and three unscheduled events). The kWh savings were calculated by adding the achieved kW savings and multiplying them by the total number of event hours. In applying this method to the meter level data and following the TRM, the EM&V team calculated kW and kWh savings that matched that of Entergy. Therefore, no adjustments were made to the program savings. The table above shows both the EM&V team and Entergy's calculated kW and kWh savings.

Evaluated savings for the Entergy Load Management program are 7,747 kW and 73,753 kWh. The realization rate for both kW and kWh is 100 percent with a documentation score of Good.

6.5 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 29 provides a summary of claimed savings for Entergy's programs in PY2019 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2019 tracking data provided to the EM&V team for the EM&V database.

Table 29. PY2019 Claimed Savings (Tracking-System-Only Evaluated Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Residential SOP	18.9%	3,962	3,962	100.0%	12.8%	5,725,406	5,725,406	100.0%
Residential Solutions	9.4%	1,973	1,973	100.0%	10.6%	4,710,435	4,710,435	100.0%
Hard-to-Reach SOP	8.9%	1,859	1,859	100.0%	6.0%	2,675,040	2,675,040	100.0%

7.0 ONCOR ELECTRIC DELIVERY, LLC IMPACT EVALUATION RESULTS

This section presents the evaluated savings and cost-effectiveness results for Oncor Electric Delivery, LLC's (Oncor) energy efficiency portfolio. The key findings are summarized first, followed by details for each program in the portfolio that had a high or medium evaluation priority. Finally, a list of the low evaluation priority for which claimed savings were verified through the EM&V database are included.

7.1 KEY FINDINGS

7.1.1 Evaluated Savings

Oncor's evaluated savings for PY2019 were 167,467 in demand (kW) and 260,120,505 in energy (kWh) savings. The overall kW and kWh portfolio realization rates are approximately 100 percent. Oncor was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (Table 33), which also supported healthy realization rates.

Table 30 shows the claimed and evaluated demand savings for Oncor's portfolio and broad customer sector/program categories.

Table 30. Oncor PY2019 Claimed and Evaluated Demand Savings

Level of analysis	Percentage portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Precision at 90% confidence
Total portfolio	**100.0%**	**167,449**	**167,467**	**100.0%**	**0.2%**
Commercial	16.9%	28,349	28,367	100.1%	1.2%
Residential	27.1%	45,426	45,426	100.0%	0.0%
Low-income	2.5%	4,249	4,249	100.0%	0.0%
Load management*	53.4%	89,425	89,425	100.0%	0.0%

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Table 31 shows the claimed and evaluated energy savings for Oncor's portfolio and broad customer sector/program categories for PY2019.

Table 31. Oncor PY2019 Claimed and Evaluated Energy Savings

Level of analysis	Percentage portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Precision at 90% confidence
Total portfolio	**100.0%**	**260,088,858**	**260,120,505**	**100.0%**	**0.3%**
Commercial	51.7%	134,340,038	134,371,685	100.0%	0.6%
Residential	45.2%	117,448,637	117,448,637	100.0%	0.0%
Low-income	3.1%	8,031,890	8,031,890	100.0%	0.0%
Load management*	0.1%	268,294	268,294	100.0%	0.0%

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Program-level realization rates are discussed in the detailed findings sub-sections. However, it is important to note that these results should only be viewed qualitatively due to the small sample sizes at the utility program level.

In program-level realization rates, we have also included a program documentation score of good, fair, or limited, as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent to 89 percent of the evaluated savings estimates received a score of good or fair. A score of "limited" was given if less than 70 percent of savings received a score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs or high savings programs have been identified. Oncor received a “good” program documentation score for all but one of its evaluated programs. The exception is its Basic Commercial SOP, which received a documentation score of “fair”.

7.1.2 Cost-Effectiveness Results

Oncor's overall portfolio had a cost-effectiveness score of 2.9, or 3.1 excluding low-income programs.

The more cost-effective programs were Retail Platform Market Transformation Program (MTP) and Basic Commercial Standard Offer Program (SOP). Commercial Retail Platform MTP shows particularly high cost-effectiveness since the program allocates five percent of the lamps sold and budget from the residential sector program. The commercial sector applies higher savings assumptions, resulting in higher cost-effectiveness results. The less cost-effective programs were Retro-Commissioning MTP and Residential Demand Response SOP. All of Oncor's programs were cost-effective in 2019.

The lifetime cost of evaluated savings was $0.010 per kWh and $16.26 per kW.

Table 32. Oncor Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total Portfolio	**2.9**	**2.9**	**2.7**
Total Portfolio excluding low-income programs	**3.1**	**3.1**	**2.8**
Commercial	**3.8**	**3.8**	**3.5**
Custom Commercial SOP	3.0	3.0	2.7
Basic Commercial SOP	4.0	4.0	3.6
Solar PV SOP	1.5	1.5	1.5
Small Business Direct Install MTP	1.9	1.9	1.8
Retail Platform MTP	52.7	52.7	47.4
Retro-Commissioning MTP	1.3	1.3	1.2
Residential	**2.8**	**2.8**	**2.6**
Home Energy Efficiency SOP	2.4	2.4	2.2
Solar PV SOP	1.5	1.5	1.4
Retail Platform MTP	6.8	6.8	6.1
Hard-to-Reach SOP	2.0	2.0	2.0
Low Income*	**2.9**	**2.9**	**2.9**
Targeted Weatherization Low-Income SOP*	2.9	2.9	2.9
Load Management	**1.4**	**1.4**	**1.4**
Commercial Load Management SOP	1.4	1.4	1.4
Residential Demand Response SOP	1.3	1.3	1.3

* The low-income program is evaluated using the SIR.

7.2 CLAIMED SAVINGS ADJUSTMENTS

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 33 summarizes claimed savings adjustments recommended by the EM&V team. Realization rates assume the following adjustments will be included in Oncor's June 1 filing.

Table 33. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF[10] Filing)

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Basic Commercial SOP	0.00	-130,941.00
Small Business Direct Install MTP	-22.60	-33,880.90
Total	**-22.60**	**-164,821.90**

7.3 DETAILED FINDINGS—COMMERCIAL (MEDIUM EVALUATION PRIORITY)

7.3.1 Basic Commercial Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
11.1%	18,669	18,683	100.1%	35.9%	93,296,463	93,286,426	100.0%	Fair

Completed desk reviews*	On-site M&V
11	6

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Basic Commercial SOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for six projects. Three projects had adjustments of less than five percent, and three projects had adjustments greater than five percent compared to the originally claimed savings. Oncor accepted the evaluated results and matched the claimed kWh savings to those of the evaluations for the one project with significant adjustments and a realization rate lower than 100 percent kWh. The final program realization rate is, therefore, nearly 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1196430: The energy efficiency project included interior and exterior lighting retrofits at a uniform retail and cleaning facility. During the desk review and on-site M&V

[10] Energy efficiency cost recovery factor

visit, the EM&V team noted that the claimed savings were calculated using an older version of the Oncor calculator. The coincidence factor for *outdoor: dusk to dawn* lighting was adjusted from 0.69 to the TRM 6.0 value of 0.71. This adjustment slightly increased peak demand savings and resulted in realization rates of 103 percent kW and 100 percent kWh.

Participant ID 1196539: The energy efficiency project included exterior lighting retrofits at a parking lot. During the desk review and on-site M&V visit, the EM&V noted that the claimed savings were calculated using an older version of the Oncor calculator. The coincidence factor for lighting was adjusted from 0.61 to the TRM 6.0 value of 0.71. This adjustment increased peak demand savings. Wattages for several installed fixtures were also corrected from 35.0 W claimed to 34.5 W using the DLC qualified products lists. The 2019 version of the LSF calculator allows for wattages in 0.5 increments; therefore, the rated wattage was adjusted to the closest wattage in the LSF calculator. Overall, the corrections resulted in realization rates of 116 percent kW and 100 percent kWh.

Participant ID 1196737: The energy efficiency project included exterior lighting retrofits at a parking lot. During the desk review and on-site M&V visit, the EM&V team corrected the qualification of the 42 W-LED fixtures and confirmed their rated wattage fixtures using the DLC qualified products lists. This adjustment increased peak demand and energy savings and resulted in realization rates of 106 percent kW and kWh.

Participant ID 1196738: The energy efficiency project included air sealing and infiltration measures at an apartment complex. During the desk review, the EM&V team adjusted the baseline for the savings calculation for the air insulation portion of the project. The claimed savings calculation included attic area calculations for each unit with varying insulation levels between R-0 and R-4. The EM&V team adjusted the insulation to a single weighted R-value was calculated for the whole building. This correction decreased peak and energy savings and resulted in realization rates of 98 percent kW and 97 percent kWh.

Participant ID 1294701: The energy efficiency project included an early replacement of HVAC equipment at a multifamily apartment building. During the desk review, the EM&V team noted that there was a kWh savings discrepancy affecting all installed units by the same percentage. Due to limited documentation included in an eTRM submittal, the EM&V team was not able to identify the reason for the discrepancy. The ex-post savings calculation resulted in realization rates of 100 percent kW and 89 percent kWh.

Participant ID 1294702: The energy efficiency project included an early replacement of HVAC equipment at a multifamily apartment building. During the desk review and on-site M&V visit, the EM&V team identified several HVAC units that replaced equipment that was less than four years old. Given the Federal appliance minimum efficiency standard went into effect in 2015, these units should use the new construction baseline instead of the early retirement baseline. The EM&V team corrected the baseline for the savings calculation. This adjustment resulted in realization rates of 100 percent kW and 96 percent kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for five projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications or AHRI certifications, pre- and post-

inspection notes, project savings calculators, and photographic documentation of existing and new equipment. However, partial documentation was provided for the other six projects. Two projects lacked most of the documentation needed for savings evaluation (no calculators, project savings summary, or invoices). Savings calculators were also not provided for two other projects that were eTRM submittals. The remaining two projects lacked project description (for example, to help verify the building type). Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. Overall, the EM&V team assigned a program documentation score of "fair".

7.3.2 Custom Commercial Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
0.3%	572	572	100.0%	1.1%	2,765,155	2,765,364	100.0%	Good

Completed desk reviews*	On-site M&V
9	4

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Custom Commercial SOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for two projects. Both projects had adjustments of less than five percent compared to the originally claimed savings, and therefore, the final program realization rate is nearly 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1196387: The energy efficiency project included interior and exterior lighting retrofits at a manufacturing facility. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed fixtures from 307.5 W claimed to 307.0 W using the DLC qualified products list. The installed quantity for two line items were removed from the calculator because the fixtures were not retrofitted, as the pre-existing fixtures were already LEDs. Overall, these adjustments resulted in a negligible increase in energy savings and realization rates of 100 percent kW and kWh.

Participant ID 1290143: The energy efficiency project included interior and exterior lighting retrofits at a non-refrigerated warehouse. During the desk review, the EM&V team calculated savings using the Oncor v2019.3 calculator, while claimed savings were calculated using the Oncor v2019.2 calculator. Savings from controls were not included. The adjustment resulted in a negligible increase in peak and energy savings and realization rates of 100 percent kW and kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for eight projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications or AHRI certifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment, which are significant efforts by the utility to verify equipment conditions and quantities. Partial documentation was provided for one project where no M&V plan and explanation of savings calculation methodology was provided. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of "good".

7.3.3 Small Business Direct Install Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
1.1%	1,892	1,895	100.2%	3.5%	9,150,313	9,191,787	100.5%	Good

Completed desk reviews*	On-site M&V
14	7

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Small Business Direct Install MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for five projects. Four projects had adjustments of less than five percent, and one project had adjustments greater than five percent compared to the originally claimed savings. Oncor accepted the evaluated results and matched the claimed savings to those of the evaluations for the project with significant adjustment, and therefore, the final program realization rate is nearly 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1252411: The energy efficiency project included interior and exterior lighting retrofits at a fire station. During the desk review, the EM&V team adjusted the quantity of the post-retrofit 30 W fixtures from 45 claimed to 43, based on the purchase order. The adjustment resulted in a negligible decrease in peak and energy savings and realization rates of 100 percent kW and kWh.

Participant ID 1252445: The energy efficiency project included exterior lighting retrofits at a parking lot. During the desk review and on-site M&V visit, the EM&V adjusted the wattages for several installed lighting fixtures from 39.0 W claimed to 41.0 W using the DLC qualified products lists. The *area type* was also corrected for one of the line items in the Oncor calculator to match the building type information. Overall, the adjustments

resulted in a negligible decrease in peak and energy savings and realization rates of 100 percent kW and kWh.

Participant ID 1252448: The energy efficiency project included interior and exterior lighting retrofits at a religious building. During the desk review, the EM&V team adjusted the wattages for 54 installed screw-in lamps from 9.0 W claimed to 9.5 W using the ENERGY STAR® qualified products lists. The 2019 version of the LSF calculator allows for wattages in 0.5 increments; therefore, the rated wattage was adjusted to the closest wattage in the LSF calculator. Overall, this correction resulted in a negligible decrease in peak demand and energy savings and realization rates of 100 percent kW and kWh.

Participant ID 1252456: The energy efficiency project included interior and exterior lighting retrofits at a school. During the desk review and on-site M&V visit, the EM&V team noted that the school will no longer have a summer session starting in 2020. Since the project was completed after the last planned summer session, the building type was corrected from *'education (summer)* to *education (no summer* in the calculator. This building type adjustment resulted in a significant decrease in peak demand and energy savings and realization rates of 47 percent kW and 80 percent kWh.

Participant ID 1252467: The energy efficiency project included interior and exterior lighting retrofits at a public assembly building. During the desk review, the EM&V team adjusted the wattages for several installed screw-in lamps from 9.0 W claimed to 9.5 W using the ENERGY STAR® qualified products lists. The 2019 version of the LSF calculator allows for wattages in 0.5 increments; therefore, the rated wattage was adjusted to the closest wattage in the LSF calculator. Overall, this correction resulted in a negligible decrease in peak demand and energy savings and realization rates of 100 percent kW and kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for 13 projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications or AHRI certifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment, which are significant efforts by the utility to verify equipment conditions and quantities. Partial documentation was provided for one project that lacked various components including the pre-photos and inspection/project notes discussing adjustments. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of “good”.

7.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

7.4.1 Commercial Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
35.8%	60,000	60,000	100.0%	0.1%	180,000	180,000	100.0%	Good

Completed desk reviews*	On-site M&V
N/A	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

The EM&V team evaluated the Commercial Load Management SOP by applying the TRM calculation methodology to interval meter data. The meter data were supplied in 15-minute increments at the ESI ID level. A single load management event occurred in PY2019 on June 28, 2019, from 2:00 p.m. to 5:00 p.m.

The EM&V team received the interval meter data as well as spreadsheets detailing the Oncor calculated baseline load, event load, and savings results for each event and ESI ID (18 sponsors and 284 ESI IDs). While reviewing individual meter savings differences, the EM&V team found that Oncor is using a conservative approach by not setting savings to zero in cases where the calculation methodology produced negative savings. Per TRM 6.0, in cases where the savings algorithm produces negative savings, the negative savings can be set to zero. The table above shows both the EM&V team and Oncor's calculated kW and kWh savings.

The evaluated savings for Oncor's Commercial Load Management SOP are 95,518 kW and 289,269 kWh. These savings were matched to Oncor's contracted savings claimed in their EEPR—60,000 kW, and 180,000 kWh—therefore, the realization rate for both kW and kWh is 100 percent.

7.4.2 Residential Demand Response Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
17.6%	29,425	29,425	100.0%	0.0%	88,294	88,294	100.0%	Good

Completed desk reviews*	On-site M&V
N/A	N/A

*The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

The EM&V team evaluated the Oncor Residential Demand Response SOP by applying the TRM calculation methodology to interval meter data. The meter data were supplied in 15-minute increments at the ESI ID level. A single demand response event occurred on June 27, 2019, from 3:15 p.m. to 6:00 p.m.

The EM&V team received the interval meter data as well as spreadsheets detailing the Oncor calculated baseline load, event load, and savings results for each event and ESI ID. Additionally, Oncor provided documentation on its treatment of meters that received zero savings or had no meter data during the event available. These meters totaled 1.35 percent of the program population and were removed from the savings calculation. The savings were then determined for the remaining meters per the TRM and EM&V guidance. The EM&V team was able to confirm that verified savings matched Oncor's savings calculation. The table above shows both the EM&V team and Oncor's calculated kW and kWh savings.

Evaluated savings for the Oncor Residential Demand Response SOP are 29,426 kW and 88,294 kWh. The realization rate for both kW and kWh is 100 percent.

7.5 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 34 provides a summary of claimed savings for Oncor's programs in PY2019 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2019 tracking data provided to the EM&V team for the EM&V database.

Table 34. PY2019 Claimed Savings (Tracking-System-Only Evaluated Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Retail Platform MTP (Com)	3.0%	5,075	5,075	100.0%	7.9%	20,616,328	20,616,328	100.0%
Home Energy Efficiency SOP	11.3%	18,860	18,860	100.0%	13.8%	35,959,167	35,959,167	100.0%
Hard-to-Reach SOP	7.9%	13,173	13,173	100.0%	7.6%	19,638,109	19,638,109	100.0%
Retail Platform MTP (Res)	7.1%	11,887	11,887	100.0%	21.9%	56,949,587	56,949,587	100.0%
Targeted Weatherization Low-Income SOP	2.5%	4,249	4,249	100.0%	3.1%	8,031,890	8,031,890	100.0%

7.6 SUMMARY OF LOW PRIORITY EVALUATION PROGRAMS

Table 35 provides a summary of claimed savings for Oncor's low evaluation priority programs in PY2019, including the programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2019 tracking data provided to the EM&V team for the EM&V database.

Table 35. PY2019 Claimed Savings (Low Evaluation Priority Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Retro-Commissioning MTP	0.0%	0	0	N/A	0.7%	1,787,403	1,787,403	100.0%
Solar PV SOP (Com)	1.3%	2,141	2,141	100.0%	2.6%	6,724,377	6,724,377	100.0%
Solar PV SOP (Res)	0.9%	1,506	1,506	100.0%	1.9%	4,901,773	4,901,773	100.0%

8.0 SOUTHWESTERN ELECTRIC POWER COMPANY EVALUATION RESULTS

This section presents the evaluated savings and cost-effectiveness results for Southwestern Electric Power Company's (SWEPCO) energy efficiency portfolio. The key findings are summarized first, followed by details for each program in the portfolio that had a high or medium evaluation priority. Finally, a list of the low evaluation priority for which claimed savings were verified through the EM&V database are included.

8.1 KEY FINDINGS

8.1.1 Evaluated Savings

SWEPCO's evaluated savings for PY2019 were 11,832 in demand (kW) and 16,234,309 in energy (kWh) savings. The overall kW and kWh portfolio realization rates are approximately 100 percent. SWEPCO was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (Table 39), which also supported healthy realization rates.

Table 36 shows the claimed and evaluated demand savings for SWEPCO's portfolio and broad customer sector/program categories.

Table 36. SWEPCO PY2019 Claimed and Evaluated Demand Savings

Level of analysis	Percentage portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Precision at 90% confidence
Total portfolio	**100.0%**	**11,832**	**11,832**	**100.0%**	**0.0%**
Commercial	18.0%	2,131	2,131	100.0%	0.2%
Residential	28.6%	3,382	3,382	100.0%	0.0%
Load management*	53.4%	6,319	6,319	100.0%	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Table 37 shows the claimed and evaluated energy savings for SWEPCO's portfolio and broad customer sector/program categories for PY2019.

Table 37. SWEPCO PY2019 Claimed and Evaluated Energy Savings

Level of analysis	Percentage portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Precision at 90% confidence
Total portfolio	**100.0%**	**16,232,989**	**16,234,309**	**100.0%**	**0.1%**
Commercial	64.2%	10,421,584	10,422,904	100.0%	0.1%
Residential	35.4%	5,753,682	5,753,682	100.0%	0.0%
Load management*	0.4%	57,724	57,724	100.0%	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Program-level realization rates are discussed in the detailed findings subsections. However, it is important to note that these results should only be viewed qualitatively due to the small sample sizes at the utility program level.

In program-level realization rates, we have also included a program documentation score of good, fair, or limited, as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent to 89 percent of the evaluated savings estimates received a score of good or fair. A score of "limited" was given if less than 70 percent of savings received a score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs or high savings programs have been identified. SWEPCO received a "Good" program documentation score for all its programs except SCORE MTP, which received a "Fair" program documentation score.

8.1.2 Cost-Effectiveness Results

SWEPCO's overall portfolio had a cost-effectiveness score of 2.6.

The more cost-effective programs were Commercial Solutions Market Transformation Program (MTP) and Commercial Standard Offer Program (SOP). The less cost-effective programs were Open MTP, Load Management SOP, and Hard-to-Reach SOP. All of SWEPCO's programs were cost-effective in 2019.

The lifetime cost of evaluated savings was $0.011 per kWh and $16.88 per kW.

Table 38. SWEPCO Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total Portfolio	**2.6**	**2.6**	**2.4**
Commercial	**2.9**	**2.9**	**2.6**
Commercial Solutions MTP	3.1	3.1	2.8
Commercial SOP	3.7	3.7	3.3
Open MTP	1.0	1.0	0.9
SCORE MTP	2.8	2.8	2.5
Residential	**2.4**	**2.4**	**2.3**
Residential SOP	2.6	2.6	2.4
Hard-to-Reach SOP	2.2	2.2	2.2
Load Management	**2.1**	**2.1**	**2.1**
Load Management SOP	2.1	2.1	2.1

8.2 CLAIMED SAVINGS ADJUSTMENTS

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 39 summarizes claimed savings adjustments recommended by the EM&V team. Realization rates assume the following adjustments will be included in SWEPCO's May 1 filing.

Table 39. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF[11] Filing)

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial SOP	2.80	20,475.00
Open MTP	0.00	-1,217.30
SCORE MTP	-18.30	-126,199.00
Total	**-15.50**	**-106,941.30**

[11] Energy efficiency cost recovery factor

8.3 DETAILED FINDINGS—COMMERCIAL (MEDIUM EVALUATION PRIORITY)

8.3.1 Commercial Solutions Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
3.8%	455	455	100.0%	13.2%	2,144,146	2,144,146	100.0%	Good

Completed desk reviews*	On-site M&V
5	2

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above. The EM&V did not suggest any savings adjustments, and therefore, the final program realization rate is 100 percent.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for all projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of the existing and new equipment, which are significant efforts by the utility to verify equipment conditions and quantities. Since sufficient documentation was provided for all projects, the EM&V team assigned a program documentation score of “good.”

8.3.2 Commercial Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
7.7%	916	917	100.0%	32.0%	5,197,934	5,199,267	100.0%	Good

Completed desk reviews*	On-site M&V
7	4

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Commercial SOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for three projects. Two projects had adjustments of less than five percent, and one project had adjustments greater than five percent compared to the originally claimed savings. SWEPCO accepted the evaluated results and matched the claimed savings to those of the evaluations for the one project with significant adjustment, and therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

ParticipantID 1200205: The energy efficiency project included interior and exterior lighting retrofits and de-lamping at a hardware store. During the desk review, the EM&V team corrected wattages for several installed fixtures using the DLC qualified products list: from 300 W claimed to 300.5 W, from 40 W claimed to 38 W, from 30 W claimed to 31.5 W, from 40 W claimed to 42.5 W, from 50 W claimed to 47.5 W, and from 40 W claimed to 41 W. The wattage adjustments resulted in a slight increase in energy and peak demand savings and realization rates of 101 percent kW and kWh.

ParticipantID 1200207: The energy efficiency project included interior lighting retrofits at a 24-hour retail store. During the desk review and on-site M&V visit, the EM&V team corrected wattages for the 628 installed LED fixtures from 78 W claimed to 73.5 W using the DLC qualified products list. The wattage adjustment resulted in an increase in energy and peak demand savings and realization rates of 113 percent kW and kWh.

ParticipantID 1224468: The energy efficiency project included exterior lighting retrofits at a medical center. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed fixtures using the DLC qualified products list: from 113 W claimed to 113.5 W, from 56 W claimed to 56.5 W, and from 100 W claimed to 100.5 W. The LSF calculator allows for wattages in 0.5 increments; therefore, the closest rated wattages were utilized. The wattage adjustments resulted in a negligible decrease in energy savings and realization rates of 100 percent kW and kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for five of the seven projects that had desk reviews completed because sufficient documentation was provided for the sites. The project documentation included invoices, QPL qualifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of the existing and new lighting types, which are significant efforts by the utility to verify equipment conditions and quantities. However, partial documentation was provided for the other two projects. One project documentation lacked invoices and post-inspection notes, and the other project documentation lacked pre- and post-savings calculators, specification sheets, pre-inspection photos, and post-inspection notes. Despite the missing documentation, the EM&V team was able to evaluate the savings for these two projects. Since sufficient documentation was provided for most of the projects, the EM&V team assigned a program documentation score of Good.

8.3.3 Open Market Transformation Program (MTP)

Program contribution to Portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
2.1%	253	253	100.0%	6.4%	1,035,302	1,035,288	100.0%	Good

Completed desk reviews*	On-site M&V
4	2

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Open MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for all four projects. Three projects had adjustments of less than five percent, and one project had adjustments greater than five percent compared to the original claimed savings. SWEPCO accepted the evaluated results and matched the claimed kWh savings to those of the evaluations for the one project with significant adjustments, and therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

ParticipantID 1200596: The energy efficiency project included exterior lighting retrofits as well as interior lighting retrofits with occupancy sensors at a non-foodservice facility. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed fixtures from 15 W claimed to 14.5 W using the DLC qualified products list. The LSF calculator allows for wattages in 0.5 increments; therefore, the closest rated wattage was utilized. In addition, the number of installed lamps was adjusted from 46 claimed to 43 per on-site M&V visit findings. Other corrections addressed slight variations in categorizations of "LED tube" or "fixture," but these did not affect the project savings.

Overall, the adjustments resulted in realization rates of 102 percent kW and 101 percent kWh.

ParticipantID 1200840: The energy efficiency project included interior and exterior lighting retrofits at a religious facility. During the desk review, the EM&V team corrected wattages for several installed fixtures from 80 W claimed to 78 W using the DLC qualified products list. The wattage adjustment resulted in a negligible increase in energy savings and realization rates of 100 percent kW and kWh.

ParticipantID 1201063: The energy efficiency project included interior and exterior lighting retrofits at a non-foodservice facility. During the desk review, the EM&V team adjusted the building type from "retail other" to "service (non-food)." This adjustment resulted in a decrease in energy and peak demand savings and realization rates of 95 percent kW and 85 percent kWh.

ParticipantID 1201065: The energy efficiency project included interior lighting retrofits at a 24-hour retail facility. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed fixtures using the DLC qualified products list: from 100 W claimed to 100.5 W, and from 18 W claimed to 18.5 W. The LSF calculator allows for wattages in 0.5 increments; therefore, the closest rated wattages were utilized. The wattage adjustments resulted in a negligible decrease in energy savings and realization rates of 100 percent kW and kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for all projects that had desk reviews completed because sufficient documentation was provided for the sites. The project documentation included invoices, QPL qualifications, pre- and post-inspection notes, the project savings calculators, and photographic documentation of the existing and new lighting types, which are significant efforts by the utility to verify equipment conditions and quantities. Although specification sheets were missing for two projects and post-inspection sheets were missing for one project, the EM&V team was satisfied overall with the project documentation provided and assigned a program documentation score of Good.

8.3.4 SCORE Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
4.3%	506	506	100.0%	12.6%	2,044,202	2,044,202	100.0%	Fair

Completed desk reviews*	On-site M&V
4	2

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 SCORE MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for three projects. One project had adjustments of less than five percent, and two projects had adjustments greater than five percent compared to the original claimed savings. SWEPCO accepted the evaluated results and matched the claimed savings to those of the evaluations for the project with significant adjustment, and therefore the final program realization rate is 99 percent kW and 100 percent kWh. Further details of the EM&V findings are provided below.

ParticipantID 1201163: The energy efficiency project included interior lighting retrofits at several schools. During the desk review, the EM&V team utilized the v2019.1 LSF calculator instead of the submitted v2018.5 calculator. Although no adjustments were made, the v2019.1 LSF calculator reduced the peak demand savings. The associated coincidence factor (CF) is 0.39, which is lower than the CF in the v2018.5 version (0.47). This difference resulted in realization rates of 83 percent kW and 100 percent kWh.

ParticipantID 1252023: The energy efficiency project included interior and exterior lighting retrofits at a college campus. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed fixtures using the DLC qualified products list: from 13 W claimed to 12 W, from 5 W claimed to 9 W, from 30 W claimed to 31.5 W, from 56 W claimed to 57.5 W, from 20 W claimed to 19.5 W, from 19 W claimed to 18 W, from 39 W claimed to 38.5 W, from 56 W claimed to 55.5 W, from 60 W claimed to 57 W, and from 261 W claimed to 398 W. Some of these adjustments were a result of the v2019.1 LSF calculator allowing for wattages in 0.5 increments. The EM&V team also adjusted the qualification for 153 screw-in lamps and several exterior fixtures from "DLC" to "non-qualified." In addition, the fixtures for one of the rooms were removed from the savings calculation per on-site M&V visit findings. The exterior energy savings, which were limited by an incentive cap, were able to be fully counted and offset the realized adjustments resulting in a realization of 100 percent kWh. The adjustments, however, decreased the peak demand savings and led to a realization rate of 97 percent kW.

ParticipantID 1252025: The energy efficiency project included interior and exterior lighting retrofits at a college campus. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed fixtures using the DLC qualified products list: from 5 W claimed to 9 W, from 84 W claimed to 84.5 W, and from 36 W claimed to 34.5 W. Some of these adjustments were a result of the v2019.1 LSF calculator allowing for wattages in 0.5 increments. The EM&V team also adjusted the qualification for 246 screw-in lamps and several exterior fixtures from "DLC" to "non-qualified." Overall, the corrections resulted in a significant decrease in energy savings and realization rates of 95 percent kW and 84 percent kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for two of the four projects that had desk reviews completed because sufficient documentation was provided for the sites. The project documentation included invoices, QPL qualifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of the existing and new lighting types, which are significant efforts by the utility to verify equipment conditions and quantities. However, partial documentation was provided for the other two projects. The EM&V team identified several deficiencies in key information needed to verify inputs and assumptions. Complete

documentation enhances the accuracy and transparency of project savings along with ease of evaluation. Therefore, the EM&V team assigned a program documentation score of Fair.

8.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

8.4.1 Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
53.4%	6,319	6,319	100.0%	0.4%	57,724	57,724	100.0%	Good

Completed desk reviews*	On-site M&V
N/A	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

The EM&V team evaluated the SWEPCO Load Management SOP by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments at the meter level. Load management events in PY2019 occurred on the following dates and times:

- May 28, 2019, from 2:00 p.m. to 3:00 p.m. (scheduled)
- May 28, 2019, from 5:00 p.m. to 6:00 p.m. (scheduled)
- May 31, 2019, from 2:00 p.m. to 3:00 p.m. (scheduled)
- May 31, 2019, from 3:00 p.m. to 4:00 p.m. (scheduled)
- June 4, 2019, from 2:00 p.m. to 3:00 p.m. (scheduled)
- July 10, 2019, from 2:00 p.m. to 6:00 p.m. (unscheduled)
- August 13, 2019, from 2:00 p.m. to 6:00 p.m. (unscheduled)

The EM&V team received interval meter data as well as a spreadsheet that summarized the event-level savings for the six sponsors across eight sites. All sites participated in one scheduled event (used as a test event) and the unscheduled events that followed.

SWEPCO calculated kW savings for each site by applying a weighted average to the kW reductions across both unscheduled events. To calculate kWh savings, SWEPCO summed kW reductions of all events (including the scheduled event) and multiplied it by the total number of event hours. In applying this method to the meter level data and following the TRM, the EM&V team calculated kW and kWh savings that matched that of SWEPCO. Therefore, no adjustments were made to the program savings. The table above shows both the EM&V team and SWEPCO's calculated kW and kWh savings. Evaluated savings for the SWEPCO Load Management program are 6,319 kW and 57,724 kWh. The realization rate for both kW and kWh is 100 percent with a documentation score of Good.

8.5 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 40 provides a summary of claimed savings for SWEPCO's programs in PY2019 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2019 tracking data provided to the EM&V team for the EM&V database.

Table 40. PY2019 Claimed Savings (Tracking-System-Only Evaluated Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Residential SOP	18.1%	2,136	2,136	100.0%	23.2%	3,774,072	3,774,072	100.0%
Hard-to-Reach SOP	10.5%	1,246	1,246	100.0%	12.2%	1,979,610	1,979,610	100.0%

9.0 TEXAS-NEW MEXICO POWER COMPANY IMPACT EVALUATION RESULTS

This section presents the evaluated savings and cost-effectiveness results for Texas-New Mexico Power Company's (TNMP) energy efficiency portfolio. The key findings are summarized first, followed by details for each program in the portfolio that had a high or medium evaluation priority. Finally, a list of the low evaluation priority for which claimed savings were verified through the EM&V database are included.

9.1 KEY FINDINGS

9.1.1 Evaluated Savings

TNMP's evaluated savings for PY2019 were 10,462 in demand (kW) and 15,742,928 in energy (kWh) savings. The overall kW and kWh portfolio realization rates are 100 percent. TNMP was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (see Table 44), which also supported healthy realization rates.

Table 41 shows the claimed and evaluated demand savings for TNMP's portfolio and broad customer sector/program categories.

Table 41. TNMP PY2019 Claimed and Evaluated Demand Savings

Level of analysis	Percentage portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Precision at 90% confidence
Total portfolio	**100.0%**	**10,462**	**10,462**	**100.0%**	**0.0%**
Commercial	20.8%	2,180	2,180	100.0%	0.0%
Residential	38.1%	3,988	3,988	100.0%	0.0%
Low-income	6.0%	627	627	100.0%	0.0%
Load management*	35.1%	3,667	3,667	100.0%	0.0%

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Table 42 shows the claimed and evaluated energy savings for TNMP's portfolio and broad customer sector/program categories for PY2019.

Table 42. TNMP PY2019 Claimed and Evaluated Energy Savings

Level of analysis	Percentage portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Precision at 90% confidence
Total portfolio	**100.0%**	**15,742,812**	**15,742,928**	**100.0%**	**0.0%**
Commercial	49.8%	7,847,697	7,847,813	100.0%	0.0%
Residential	43.5%	6,852,556	6,852,556	100.0%	0.0%
Low-income	6.6%	1,031,552	1,031,552	100.0%	0.0%
Load management*	0.1%	11,007	11,007	100.0%	0.0%

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Program-level realization rates are discussed in the detailed findings subsections. However, it is important to note that these results should only be viewed qualitatively due to the small sample sizes at the utility program level.

In program-level realization rates, we have also included a program documentation score of good, fair, or limited, as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent to 89 percent of the evaluated savings estimates received a score of good or fair. A score of "limited" was given if less than 70 percent of savings received a score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs or high savings programs have been identified.

TNMP received a “good” program documentation score for its Commercial Solutions MTP and Load Management SOP. For the Open for Small Business MTP and SCORE/CitySmart MTP, TNMP received a “fair” documentation score as the EM&V team found partial documentation for some projects within each of these programs.

9.1.2 Cost-Effectiveness Results

TNMP's overall portfolio had a cost-effectiveness score of 2.3, or 2.5 excluding low-income programs.

The more cost-effective programs were Residential SOP and Commercial Solutions MTP. The less cost-effective programs were Load Management SOP and Hard-to-Reach SOP.

The lifetime cost of evaluated savings was $0.011 per kWh and $17.19 per kW.

Table 43. TNMP Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total Portfolio	**2.3**	**2.3**	**2.0**
Total Portfolio excluding low-income programs	**2.5**	**2.5**	**2.2**
Commercial	**2.4**	**2.4**	**2.2**
Open for Small Business MTP	1.9	1.9	1.8
SCORE/CitySmart MTP	2.3	2.3	2.0
Commercial Solutions MTP	2.8	2.8	2.5
Residential	**2.7**	**2.7**	**2.4**
High-Performance Homes MTP	2.4	2.4	1.7
Residential SOP	2.9	2.9	2.6
Hard-to-Reach SOP	1.9	1.9	1.9
Low Income*	**2.4**	**2.4**	**2.4**
Low Income Weatherization*	2.4	2.4	2.4
Load Management	**1.3**	**1.3**	**1.3**
Load Management SOP	1.3	1.3	1.3

* The low-income sector and Low-Income Weatherization program are evaluated using the SIR.

9.2 CLAIMED SAVINGS ADJUSTMENTS

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 44 summarizes claimed savings adjustments recommended by the EM&V team. Realization rates assume the following adjustments will be included in TNMP's June 1 filing.

Table 44. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF[12] Filing)

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Open for Small Business MTP	-4.30	-6,239.50
SCORE/CitySmart MTP	5.80	1,165.00
Total	**1.50**	**-5,074.50**

[12] Energy efficiency cost recovery factor

9.3 DETAILED FINDINGS—COMMERCIAL (MEDIUM EVALUATION PRIORITY)

9.3.1 Commercial Solutions Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
8.2%	853	853	100.0%	24.6%	3,871,584	3,871,640	100.0%	Good

Completed desk reviews*	On-site M&V
4	2

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for one project. The project had a minor adjustment of less than five percent compared to the originally claimed savings. TNMP did not adjust the savings for this minor change, and the final program realization rate is still 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1200574: The energy efficiency project included an interior lighting retrofit at a retail building. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed fixtures from 32.0 W claimed to 31.5 W, and 48.5 W to 49.0 W, using the DLC qualified products list. The increase in peak demand and energy savings was minimal, and overall, the adjustments resulted in realization rates of 100 percent kW and kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for all projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications, equipment specifications, M&V reports, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment, which are significant efforts by the utility to verify equipment conditions and quantities. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of “good”.

9.3.2 Open for Small Business Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
6.0%	633	633	100.0%	11.3%	1,779,305	1,779,305	100.0%	Fair

Completed desk reviews*	On-site M&V
8	4

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Open for Small Business MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for five projects. Four projects had adjustments of less than five percent, and one project had adjustments greater than five percent compared to the originally claimed savings. TNMP accepted the evaluated results and matched the claimed kWh savings to those of the evaluations for the three projects with adjustments greater than one percent, and therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below and have been separated to discuss the lighting projects separately from the air infiltration projects.

Participant ID 1201077: The energy efficiency project included interior lighting retrofits at a retail building. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed fixtures from 40.0 W claimed to 41.5 W, and from 18.0 W to 18.5 W, using the DLC qualified products list. The EM&V team also adjusted wattages for a screw-in lamp from 9.0 W claimed to 9.5 W, using the ENERGY STAR® qualified products list. The LSF calculator allows for wattages in 0.5 increments; therefore, all wattages were adjusted to the closest wattages in the LSF calculator. Overall, these corrections decreased peak demand and energy savings and resulted in realization rates of 98 percent kW and kWh.

Participant ID 1201086: The energy efficiency project included interior and exterior lighting retrofits and a replacement of refrigerated case lighting at a small retail facility. During the desk review, the EM&V team identified a clerical error where half of the calculated kWh savings was entered for a line item in the calculator. Also, two fixtures were adjusted to account for the half-watt changes in the TRM. Overall, these corrections resulted in a negligible increase in kWh energy savings and realization rates of 100 percent kW and kWh.

Participant ID 1250883: The energy efficiency project included interior lighting retrofits at a retail building. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed fixtures from 40.0 W claimed to 41.5 W, using the DLC qualified products list. The wattage adjustment decreased energy savings and resulted in realization rates of 98 percent kW and kWh.

Entrance and Exit Door Air Infiltration

The EM&V team reviewed five entrance and exit door air infiltration projects, with on-site M&V visits completed for two of these projects. Overall, the lack of documentation limited the ability of the EM&V team to complete the desk reviews. The ex-ante savings for the building envelope measures and the building type were not provided. The details in the customer proposal and invoice confirmed the door quantities, but no dimensions were included. The door gaps were not clearly shown with photos of pre-measurements, and post-install photos showed the installed measures on the doors, though length measurements were not taken.

The installation length and width of the door gaps were verified for the two projects that received on-site M&V visits. Both projects had adjustments, as described below.

Participant ID 1251477: The energy efficiency project included installed door sweeps and top and side weather-stripping on three exterior doors at a retail shop. During the desk review and on-site M&V visit, the EM&V team determined the measurements of *linear feet of installed weather-stripping* that sealed door gaps and the width of the openings. The weather-stripping was installed effectively, although the measurement combinations could not recreate the energy savings. The ex-post calculation resulted in a minor decrease in energy savings and realization rates of 99 percent kW and 100 percent kWh.

Participant ID 1251485: The energy efficiency project included installed door sweeps and top and side weather-stripping on six exterior doors at a retail supermarket. During the desk review and on-site M&V visit, the EM&V team corrected the measurements of *linear feet of installed weather-stripping* that sealed door gaps. Weather-stripping was not installed on the top edges of double doors with sensors and physical locking mechanisms. Some door edges of emergency exit double doors had weather-stripping installed but still left gaps where light and unconditioned air could easily pass through. Other areas were failing (e.g., mounting screws backed out, weather-stripping torn or missing). For such cases, the weather-stripping installed is not effective in reducing air infiltration, so the EM&V team discounted those door edges' linear feet from the ex-post energy savings. This adjustment resulted in a significant decrease in energy savings and realization rates of 79 percent kW and kWh.

The EM&V team did not adjust the three projects that did not have an on-site M&V visit because of the uncertainty in replicating the energy savings calculation. Each project provided insufficient documentation regarding the installed length of weather-stripping and door sweeps.

Participant ID 1238395: The energy efficiency project included installed door sweeps and top and side weather-stripping on two exterior doors at a tailoring service shop.

Participant ID 1251495: The energy efficiency project included installed door sweeps and top and side weather-stripping on two exterior doors at a fast-food retail shop.

Participant ID 1251504: The energy efficiency project included installed door sweeps and top and side weather-stripping on three exterior doors at a gas station.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for the three lighting projects that had desk reviews completed because sufficient documentation was provided for the sites.

Project documentation included invoices, QPL qualifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment. However, partial or limited documentation was provided for the five air infiltration reduction projects. These projects lacked most documentation and only provided the included pre-/post-pictures, general invoices, and customer proposals. The key missing documentation included equipment specifications, equipment installed length, air gap sealed, building type, HVAC type, and a calculator. Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. Overall, the EM&V team assigned a program documentation score of "fair".

9.3.3 SCORE/CitySmart Market Transformation Program (MTP)

Program contribution to Portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
6.6%	694	694	100.0%	14.0%	2,196,808	2,196,868	100.0%	Fair

Completed desk reviews*	On-site M&V
6	3

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 SCORE/City Smart MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for two projects. The two projects had adjustments of greater than five percent compared to the originally claimed savings. TNMP accepted the evaluated results and matched the claimed savings to those of the evaluations for all projects, and therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1238417: The energy efficiency project included an early replacement of air conditioning units at a high school. During the desk review and on-site M&V visit, the EM&V team adjusted the savings calculation to match the weather zone as defined in the TRM. The weather zone was corrected from zone 1 to zone 2. Overall, the change in the savings calculation approach increased peak demand and energy savings and resulted in realization rates of 148 percent kW and 203 percent kWh.

Participant ID 1250718: The energy efficiency project included interior lighting and motor retrofits at a high school. During the desk review and on-site M&V visit, the EM&V team adjusted the lighting savings for the project. The calculation was accurate, although the lighting controls savings were double counted in both the lighting controls and the LED fixtures. Removing the lighting controls savings from the LED fixtures savings resulted in a decrease in peak demand and energy savings. Overall, the adjustments resulted in realization rates of 94 percent kW and kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for three projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications or AHRI certifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment. However, partial documentation was provided for the other three projects. One project was a solar PV installation that lacked equipment specification for the inverters, invoices, installed design documents, and site inspection notes. The second project was missing invoices, post-inspection notes, and QPL certifications. The third project lacked the pre-inspection photos, which were critical because the pre-inspection notes were not consistent with the project. Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. Overall, the EM&V team assigned a program documentation score of "fair."

9.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

9.4.1 Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
35.1%	3,667	3,667	100.0%	0.1%	11,007	11,007	100.0%	Good

Completed desk reviews*	On-site M&V
N/A	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

The EM&V team evaluated the Load Management SOP by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments at the meter level. Load management events in PY2019 occurred on the following dates and times:

- June 5, 2019, from 2:00 p.m. to 3:00 p.m. (scheduled)
- August 13, 2019, from 4:30 p.m. to 6:30 p.m. (unscheduled)

The EM&V team received interval meter data as well as a spreadsheet that summarized the event-level savings for the six sponsors across 39 sites. Thirty-six sites participated in the scheduled event (used as a test event), and 25 participated in the unscheduled event. Two sites did not have any load data associated with them as they did not participate in any event.

TNMP calculated kW savings for each site by applying a weighted average to the kW reductions across both unscheduled events. To calculate kWh savings, TNMP summed kW reductions of

all events (including the scheduled event) and multiplied it by the total number of event hours. In applying this method to the meter-level data and following the TRM, the EM&V team calculated kW and kWh savings that matched that of TNMP. Therefore, no adjustments were made to the program savings. The table above shows both the EM&V team and TNMP's calculated kW and kWh savings.

Evaluated savings for the TNMP Load Management SOP are 3,667 kW and 11,007 kWh. The realization rates for both kW and kWh are 100 percent.

9.5 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 45 provides a summary of claimed savings for TNMP's programs in PY2019 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2019 tracking data provided to the EM&V team for the EM&V database.

Table 45. PY2019 Claimed Savings (Tracking-System-Only Evaluated Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Residential SOP	29.0%	3,033	3,033	100.0%	31.8%	5,000,877	5,000,877	100.0%
Hard-to-Reach SOP	5.0%	520	520	100.0%	5.5%	868,287	868,287	100.0%
High-Performance Homes MTP	4.1%	434	434	100.0%	6.2%	983,393	983,393	100.0%
Low-Income Weatherization	6.0%	627	627	100.0%	6.6%	1,031,552	1,031,552	100.0%

10.0 XCEL SOUTHWESTERN PUBLIC SERVICE COMPANY IMPACT EVALUATION RESULTS

This section presents the evaluated savings and cost-effectiveness results for Xcel Southwestern Public Service Company's (Xcel SPS) energy efficiency portfolio. The key findings are summarized first, followed by details for each program in the portfolio that had a high or medium evaluation priority. Finally, a list of the low evaluation priority for which claimed savings were verified through the EM&V database are included.

10.1 KEY FINDINGS

10.1.1 Evaluated Savings

Xcel SPS's evaluated savings for PY2019 were 9,572 in demand (kW) and 23,338,689 in energy (kWh) savings. The overall kW and kWh portfolio realization rates are approximately 100 percent. Xcel SPS was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (see Table 49), which also supported healthy realization rates.

Table 46 shows the claimed and evaluated demand savings for Xcel SPS's portfolio and broad customer sector/program categories.

Table 46. Xcel SPS PY2019 Claimed and Evaluated Demand Savings

Level of analysis	Percentage portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Precision at 90% confidence
Total portfolio	100.0%	9,573	9,572	100.0%	0.0%
Commercial	26.8%	2,568	2,567	100.0%	0.2%
Residential	34.2%	3,273	3,273	100.0%	0.0%
Low-income	2.8%	265	265	100.0%	0.0%
Load management*	35.7%	3,417	3,417	100.0%	N/A
Pilot	0.5%	50	50	100.0%	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Table 47 shows the claimed and evaluated energy savings for Xcel SPS's portfolio and broad customer sector/program categories for PY2019.

Table 47. Xcel SPS PY2019 Claimed and Evaluated Energy Savings

Level of analysis	Percentage portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Precision at 90% confidence
Total portfolio	100.0%	23,327,577	23,338,689	100.0%	0.2%
Commercial	55.0%	12,818,823	12,829,935	100.1%	0.3%
Residential	39.9%	9,316,424	9,316,424	100.0%	0.0%
Low-income	3.1%	730,512	730,512	100.0%	0.0%
Load management*	0.1%	27,312	27,312	100.0%	N/A
Pilot	1.9%	434,506	434,506	100.0%	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

Program-level realization rates are discussed in the detailed findings sub-sections. However, it is important to note that these results should only be viewed qualitatively due to the small sample sizes at the utility program level.

In program-level realization rates, we have also included a program documentation score of good, fair, or limited, as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent to 89 percent of the evaluated savings estimates received a score of good or fair. A score of "limited" was given if less than 70 percent of savings received a score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs or high savings programs have been identified.

Xcel SPS received a "good" program documentation score for the Load Management SOP, and it received fair documentation scores for the Commercial SOP, Small Commercial MTP, and Retro-Commissioning program. While a fair documentation score indicates a reasonable level of documentation, it also indicates some room for improvement. Details about what documentation the evaluation team found and reviewed are listed within each program-specific section.

10.1.2 Cost-Effectiveness Results

Xcel SPS's overall portfolio had a cost-effectiveness score of 3.2, or 3.6 excluding low-income programs.

The more cost-effective programs were Home Lighting MTP and Commercial SOP. The less cost-effective programs were Small Commercial MTP and Load Management SOP. The Commercial Home Lighting MTP result stands out at 60.3, but this is a result of the way this

program is reported. Five percent of the program bulbs and budget are allocated to the commercial sector, but commercial applications generate disproportionate savings that distort the cost-effectiveness results.

The lifetime cost of evaluated savings was $0.009 per kWh and $13.61 per kW.

Table 48. Xcel SPS Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total Portfolio	**3.2**	**3.2**	**3.0**
Total Portfolio excluding low-income programs	**3.6**	**3.6**	**3.3**
Commercial	**3.7**	**3.7**	**3.4**
Commercial SOP	5.3	5.3	4.8
Retro-Commissioning MTP	3.3	3.4	3.0
Small Commercial MTP	1.5	1.5	1.5
Home Lighting MTP	49.4	49.4	44.5
Residential	**3.8**	**3.8**	**3.5**
Residential SOP	2.4	2.4	2.1
Home Lighting MTP	10.1	10.1	9.1
Hard-to-Reach SOP	2.0	2.0	2.0
Low Income*	**2.2**	**2.2**	**2.2**
Low-Income Weatherization*	2.2	2.2	2.2
Load Management	**1.1**	**1.1**	**1.1**
Load Management SOP	1.1	1.1	1.1
Pilot	**1.8**	**1.8**	**1.8**
Refrigerator Recycling MTP Pilot	1.7	1.7	1.7
Smart Thermostat MTP Pilot	4.4	4.4	3.7

* The low-income sector and Low-Income Weatherization program are evaluated using the SIR.

10.2 CLAIMED SAVINGS ADJUSTMENTS

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 49 summarizes claimed savings adjustments recommended by the EM&V team. Realization rates assume the following adjustments will be included in Xcel SPS's May 1 filing.

Table 49. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF[13] Filing)

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial SOP	18.60	75,695.00
Retro-Commissioning MTP	-0.80	-2,224.00
Small Commercial MTP	-1.80	-12,027.00
Total	**16.00**	**61,444.00**

10.3 DETAILED FINDINGS—COMMERCIAL (MEDIUM EVALUATION PRIORITY)

10.3.1 Commercial Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
6.5%	623	621	99.6%	13.5%	3,142,792	3,143,564	100.0%	Fair

Completed desk reviews*	On-site M&V
8	4

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Commercial SOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for seven projects. Four projects had adjustments of less than five percent, and three projects had adjustments greater than five percent compared to the originally claimed savings. Xcel SPS accepted the evaluated results and matched the claimed savings to those of the evaluations for the three projects with significant adjustment, and therefore, the final program realization rate is nearly 100 percent. Further details of the EM&V findings are provided below.

[13] Energy efficiency cost recovery factor

Participant ID 1198690: The energy efficiency project included interior lighting retrofits at a non-refrigerated warehouse. During the desk review and on-site M&V visit, the EM&V team adjusted the air conditioning type from "air conditioned" to "none" since the warehouse is only heated and does not have any cooling capability. The wattage for all installed fixtures was also corrected from 150 W to 132 W using the DLC qualified products lists. Overall, these adjustments reduced peak demand savings and increased energy savings and resulted in realization rates of 97 percent kW and 101 percent kWh.

Participant ID 1228353: The energy efficiency project included interior and exterior lighting retrofits at a parking structure. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed fixtures using the DLC qualified products lists: from 43 W claimed to 41 W, from 86 W claimed to 83.5 W, from 39 W claimed to 41 W, from 59 W claimed to 58.5 W, and from 115 W claimed to 118 W. The LSF calculator allows for wattages in 0.5 increments; therefore, for some fixtures, the rated wattages were adjusted to the closest wattages in the LSF calculator. Overall, the adjustments slightly reduced the peak demand and energy savings and resulted in realization rates of 99 percent kW and kWh.

Participant ID 1228362: The energy efficiency project included interior lighting retrofits at a retail building. During the desk review and on-site M&V visit, the EM&V team adjusted wattages for several installed fixtures from 115 W claimed to 112.5 W using the DLC qualified products lists. The quantities of LED tubes and fixtures installed in different areas of the retail building were also corrected per on-site visit findings: from 1,888 LED tubes claimed to 1,916, from 28 LED tubes claimed to 14, from 12 LED tubes claimed to 6, and from 5 LED fixtures claimed to 39. Overall, the adjustments resulted in a decrease in peak demand and energy savings and realization rates of 92 percent kW and kWh.

Participant ID 1228367: The energy efficiency project included interior and exterior lighting retrofits at an educational building. During the desk review and on-site M&V visit, the EM&V team corrected wattages for several installed fixtures using the DLC and ENERGY STAR® qualified products lists: from 11 W claimed to 10.5 W, from 25 W claimed to 30 W, from 17 W claimed to 16.5 W, and from 16 W claimed to 15.5 W. The LSF calculator allows for wattages in 0.5 increments; therefore, for some fixtures, the rated wattages were adjusted to the closest wattages in the LSF calculator. The wattage adjustments resulted in a negligible decrease in peak demand and energy savings and realization rates of 100 percent kW and kWh.

Participant ID 1261659: The energy efficiency project included interior lighting retrofits at a school building. During the desk review, the EM&V team corrected the wattage for nine integrated ballast LED lamps from 5 W to 6 W using the ENERGY STAR® qualified products lists. In addition, the LSF calculator had an incorrect savings amount but correct pre- and post-retrofit equipment information that was adjusted. Overall, the adjustments resulted in a slight decrease in peak demand and energy savings and realization rates of 99 percent kW and kWh.

Participant ID 1261688: The energy efficiency project included interior lighting retrofits at a retail building. During the desk review, the EM&V team adjusted the fixture code in the LSF calculator for the pre-retrofit fixtures from "F44ILL" (4 ft. fixtures) to "F84ILL" (8 ft. fixtures) since the invoice indicates that the retrofit kits were purchased for 8 ft. fixtures. This correction drastically increased peak demand and energy savings and resulted in realization rates of 240 percent kW and kWh.

Participant ID 1261689: The energy efficiency project included interior lighting retrofits at a retail building. During the desk review, the EM&V team adjusted the fixture code in the LSF calculator for the pre-retrofit fixtures from "F44ILL" (4 ft. fixtures) to "F84ILL" (8 ft. fixtures) since the invoice indicates that the retrofit kits were purchased for 8 ft. fixtures. This correction drastically increased peak demand and energy savings and resulted in realization rates of 249 percent kW and kWh.

Documentation Score

Partial documentation was provided for five of the eight projects. The pre- and post-calculators were not provided for two projects. Five projects lacked pre- and post-photographic documentation, and three projects lacked QPL documentation. Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. Typical documentation needed includes invoices, QPL qualifications and AHRI certifications, pre- and post-inspection notes, the project savings calculators, and photographic documentation of existing and new equipment. Overall, the EM&V team assigned a program documentation score of Fair.

10.3.2 Retro-Commissioning Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
12.7%	1,214	1,216	100.1%	28.1%	6,552,893	6,563,446	100.2%	Fair

Completed desk reviews*	On-site M&V
4	2

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Retro-Commissioning MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for two projects. One project had adjustments of less than five percent, and one project had adjustments greater than five percent compared to the originally claimed savings. Xcel SPS accepted the evaluated results and matched the claimed savings to those of the evaluations for the one project with significant adjustment, and therefore, the final program realization rate is nearly 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1196333: The energy efficiency project was a new construction project that included interior lighting, HVAC equipment, roof retrofits, and low U-value windows at a hospital building. During the desk review, the EM&V team made adjustments to the lighting and windows portions of the project. For the lighting portion of the project, the EM&V team corrected wattages for several installed fixtures using the DLC and ENERGY

STAR® qualified products lists: from 31 W claimed to 32.5 W, from 21 W claimed to 22 W, from 38 W claimed to 37.5 W, from 23 W claimed to 21.5 W, and from 34 W claimed to 35.5 W. The LSF calculator allows for wattages in 0.5 increments; therefore, for some fixtures, the rated wattages were adjusted to the closest wattages in the LSF calculator. For the window portion of the project, savings were negated as north-facing windows are not eligible for program savings. Overall, the adjustments reduced the peak demand and energy savings and resulted in realization rates of 94 percent kW and 97 percent kWh.

Participant ID 1262638: The energy efficiency project included interior and exterior lighting retrofits at a hospital building. During the desk review and on-site M&V visit, the EM&V team adjusted wattages for several installed fixtures from 30 W claimed to 28 W using the DLC qualified products lists. The qualification was also corrected for other installed lighting fixtures from "non-qualified" to " ENERGY STAR®." Overall, the adjustments resulted in a small increase in peak demand and energy savings realization rates of 100 percent kW and kWh.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for two projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications and AHRI certifications, pre- and post-inspection notes, the project savings calculators, and photographic documentation of existing and new equipment. However, partial documentation was provided for the other two projects. One project was a new construction project that lacked pre- and post-savings calculators, construction plans, specification sheets, and invoices. The other project was a lighting project that lacked key documentation, such as the M&V report, photos, and QPL certifications. In addition, the calculators and pre- and post-inspection notes of the lighting project did not match the project buildings. Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. Overall, the EM&V team assigned a program documentation score of Fair.

10.3.3 Small Commercial Market Transformation Program (MTP)

Program contribution to Portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
3.3%	315	315	100.0%	6.1%	1,420,641	1,420,428	100.0%	Fair

Completed desk reviews*	On-site M&V
4	2

*Confidence intervals are not reported at the utility program level as these results should only be viewed qualitatively due to the small sample sizes.

The PY2019 Small Commercial MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team adjusted the claimed savings for four projects. Three projects had adjustments of less than five percent, and one project had adjustments greater than five percent compared to the originally claimed savings. Xcel SPS accepted the evaluated results and matched the claimed savings to those of the evaluations for the one project with significant adjustment, and therefore, the final program realization rate is nearly 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1198695: The energy efficiency project included interior lighting retrofits at a public assembly building. During the desk review and on-site M&V visit, the EM&V team adjusted the building type from "office" to "public assembly" based on the area usage. This adjustment reduced the coincidence factor and the hours of operation for the equipment. The air conditioning type was also adjusted from "none" to "air conditioned" for all line items in the LSF calculator. In addition, the EM&V team corrected wattages for several installed fixtures from 50 W claimed to 48 W and from 22 W claimed to 21 W using the DLC qualified products lists. Overall, these adjustments significantly reduced peak demand and energy savings and resulted in realization rates of 85 percent kW and 77 percent kWh.

Participant ID 1198703: The energy efficiency project included exterior lighting retrofits at a parking lot. During the desk review, the EM&V team corrected wattages for several installed fixtures from 247 W claimed to 248.5 W using the DLC qualified products list. The wattage adjustment resulted in a negligible decrease in peak demand and energy savings and realization rates of 100 percent kW and kWh.

Participant ID 1198710: The energy efficiency project included interior lighting retrofits at an office building. During the desk review and on-site M&V visit, the EM&V team adjusted wattages for several installed fixtures from 44 W to 43.5 W, and from 185 W claimed to 185.5 W using the DLC qualified products lists. The LSF calculator allows for wattages in 0.5 increments; therefore, the rated wattages were adjusted to the closest wattages in the LSF calculator. The quantities of LED tubes and fixtures installed in different areas of the office building were also corrected per on-site visit findings: from seven LED fixtures claimed to eight, from four LED tubes claimed to two, and from two LED tubes claimed to one. In addition, the air conditioning and control types for one line item in the LSF calculator were adjusted to "none" and "occupancy sensors," respectively. During the on-site M&V visit, the fixture codes, quantities, and wattages were corrected for additional fixtures from one "LED034-FIXT" to two "LED016-TUBE" (2-tube lamps), and from "LED012-FIXT" to "LED015-TUBE." Overall, the adjustments increased peak demand and energy savings and resulted in realization rates of 103 percent kW and kWh.

Participant ID 1198712: The energy efficiency project included interior lighting retrofits at an office building. During the desk review, the EM&V team corrected wattages for several installed fixtures using the DLC and ENERGY STAR® qualified products lists: from 39 W to 39.5 W, from 40 W claimed to 40.5 W, and from 13.5 W claimed to 14 W. The LSF calculator allows for wattages in 0.5 increments; therefore, the rated wattages were adjusted to the closest wattages in the LSF calculator. The wattage adjustments resulted in a slight decrease in peak demand and energy savings and realization rates of 99 percent kW and kWh.

Documentation Score

Partial documentation was provided for all four projects. The pre- and post-calculators and post-inspection notes were not provided for two projects. All four projects lacked pre- and post-photographic documentation, and three projects lacked QPL documentation and invoices. Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. Typical documentation needed includes invoices, QPL qualifications and AHRI certifications, pre- and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment. Overall, the EM&V team assigned a program documentation score of Fair.

10.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

10.4.1 Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
35.7%	3,417	3,417	100.0%	0.1%	27,312	27,312	100.0%	Good

Completed desk reviews*	On-site M&V
N/A	N/A

* The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

The EM&V team evaluated the Xcel SPS Load Management program by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments at the meter level. Load management events in PY2019 occurred on the following dates and times:

- June 21, 2019, from 2:00 p.m. to 6:00 p.m. (scheduled)
- August 12, 2019, from 2:00 p.m. to 6:00 p.m. (unscheduled)

The EM&V team received the interval meter data as well as a spreadsheet that summarized the event-level savings for the seven sponsors across 16 sites. Several sites did not have any load data associated with them for one of the events (two sites in the first event, and seven sites in the second event). All sponsors had at least one participating site that participated in at least one event.

To calculate savings at the site level, Xcel SPS averaged the kW reductions for each site, whether or not the site participated in both events. The kWh savings were calculated by adding the achieved kW savings and multiplying them by the total number of event hours. In applying this method to the meter-level data and following the TRM, the EM&V team calculated kW and kWh savings that matched that of Xcel SPS. Therefore, no adjustments were made to

the program savings. The table above shows both the EM&V team and Xcel SPS' calculated kW and kWh savings.

Evaluated savings for the Xcel SPS Load Management program are 3,417 kW and 27,312 kWh. The realization rate for both kW and kWh is 100 percent.

10.5 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 50 provides a summary of claimed savings for Xcel SPS's programs in PY2019 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2019 tracking data provided to the EM&V team for the EM&V database.

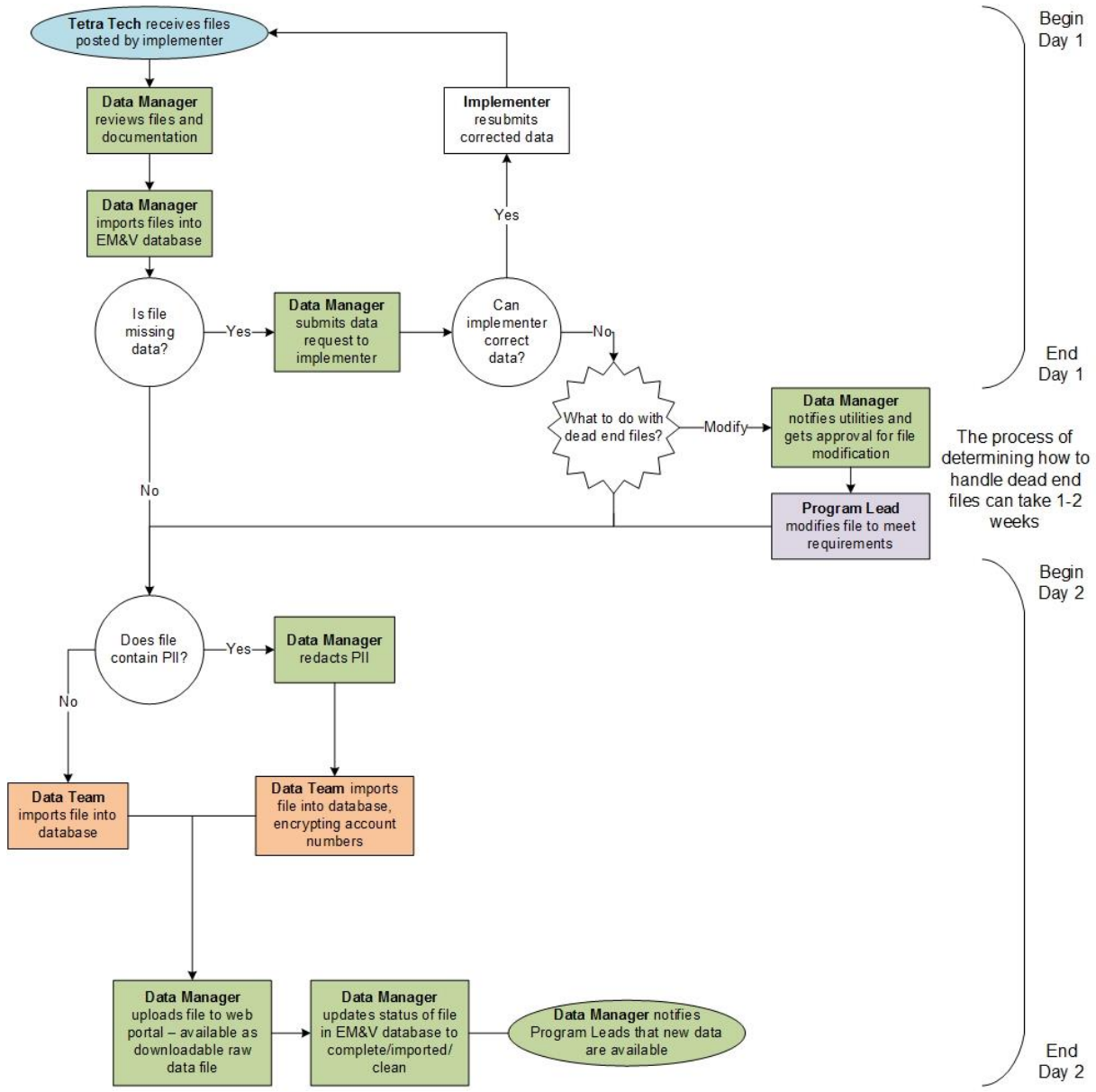
Table 50. PY2019 Claimed Savings (Tracking-System-Only Evaluated Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Home Lighting MTP (Com)	4.3%	415	415	100.0%	7.3%	1,702,497	1,702,497	100.0%
Residential SOP	9.4%	899	899	100.0%	9.1%	2,134,339	2,134,339	100.0%
Home Lighting MTP (Res)	17.6%	1,683	1,683	100.0%	24.2%	5,650,639	5,650,639	100.0%
Hard-to-Reach SOP	7.2%	691	691	100.0%	6.6%	1,531,446	1,531,446	100.0%
Low-Income Weatherization	2.8%	265	265	100.0%	3.1%	730,512	730,512	100.0%
Refrigerator Recycling MTP Pilot	0.5%	50	50	100.0%	1.7%	398,184	398,184	100.0%
Smart Thermostat MTP Pilot	0.0%	0	0	N/A	0.2%	36,322	36,322	100.0%

APPENDIX A: DATA MANAGEMENT PROCESS

Figure 3 details the data management process.

Figure 3. Data Management Process



APPENDIX B: COST-EFFECTIVENESS CALCULATIONS

This appendix describes the calculations used for modeling cost-effectiveness. This approach provides the PUCT with a consistent methodology for evaluating cost-effectiveness across the utilities.

B.1 APPROACH

The approach to the EM&V team's benefit-cost testing is based on 16 Tex. Admin. Code § 25.181, where costs and benefits are defined in section (d):

> *"The cost of a program includes the cost of incentives, measurement and verification, any shareholder bonus awarded to the utility, and actual or allocated research and development and administrative costs. The benefits of the program consist of the value of the demand reductions and energy savings, measured in accordance with the avoided costs prescribed in this subsection. The present value of the program benefits shall be calculated over the projected life of the measures installed or implemented under the program."*

This description is consistent with the PACT. Based on this definition, we collected the costs reported in the utilities' 2020 EEPRs, filed on April 1, 2020.[14] The program benefits must be calculated at a measure level in order to apply individual effective useful lives. Therefore, the savings were derived from the EM&V database, which is a comprehensive, centralized source of the utilities' program tracking data.

The present value of the benefits is calculated separately for energy and demand as follows:

$$PV = \frac{AC}{WACC - E}\left[1 - \left(\frac{1+E}{1+WACC}\right)^{n}\right]$$

Where:

AC is the avoided cost of the benefit (energy or demand).

The discount rate, *WACC*, is the utility's weighted average cost of capital.

E is the escalation rate.

n is the effective useful life of the measure.

This calculation was modified from the original evaluation plan in order to allow for including an escalation rate. The EM&V team has provided results for benefit-cost calculation using an escalation rate of two percent and without an escalation rate.

[14] PUCT filing number 50666.

The benefit-cost ratio is calculated as:

$$BC = \frac{PV_e + PV_d}{C}$$

Where:

PV_e is the present value of the avoided energy costs.

PV_d is the present value of the avoided demand costs.

C is the total program cost, including incentives, administrative, EM&V, shareholder bonus, and research and development costs.

Some costs are reported by the utilities at the portfolio level, such as R&D and shareholder bonus costs. These costs are attributed to individual programs based on each program's incentive costs as a percentage of the portfolio. EM&V costs were previously distributed among utility programs by the EM&V team based on programs' share of energy savings and evaluation priority.

B.2 SAVINGS-TO-INVESTMENT RATIO

Targeted low-income energy efficiency programs are run by all unbundled transmission and distribution utilities. These programs are evaluated using the SIR rather than the PACT described above.

The SIR is significantly different in both the benefits and costs included. The benefits are comprised of the customer's avoided energy costs. This means that the retail electric rate is used rather than the utility's avoided cost, and there is no cost associated with avoided demand. Rather than the WACC, the SIR uses a societal discount rate of three percent. The only costs included are the incentives paid to the weatherization agencies.

Table 51 lists the average retail rates paid by customers. These rates are based on data collected by Frontier Energy through weatherization agencies. The rates are updated annually based on data from the Energy Information Administration, the Bureau of Labor Statistics, and the Public Utility Commission of Texas.

Table 51. Average Energy Cost by Utility

Utility	Average kWh rate
AEP TCC	$0.12
AEP TNC	$0.12
CenterPoint	$0.13
Oncor	$0.13
TNMP	$0.12
Xcel SPS	$0.11

B.3 NET-TO-GROSS RATIOS

The following net-to-gross (NTG) ratios were used to calculate cost-effectiveness based on net savings. The EM&V team determined the NTG ratios through primary research in the PY2013 and PY2014 scope, and the majority of these were updated during the PY2017 scope.

Table 52. Net-to-Gross Ratios

Program	kWh NTG	kW NTG
Commercial		
Commercial SOP	0.91	0.89
Commercial MTP (including SCORE/CitySmart MTP)	0.86	0.99
Solar PV SOP	1.01	1.01
Small Business Program	0.95	0.95
Upstream Lighting	0.90	0.90
Retro-Commissioning	0.90	0.90
Residential		
Residential SOP	0.92	0.86
Solar PV SOP	0.96	0.95
New Homes	0.70	0.70
Upstream Lighting	0.90	0.90
A/C Tune-up/Residential MTP	0.80	0.80
Hard-to-Reach SOP	1.00	1.00
Midstream MTP	0.84	0.84
Appliance Recycling	0.79	0.79
Low-Income		
Targeted Low-Income	1.00	1.00
Load management		
Commercial Load Management SOP	1.00	1.00
Residential Demand Response SOP	1.00	1.00

APPENDIX C: QUALITY ASSURANCE/QUALITY CONTROL PROTOCOLS

This appendix documents the QA/QC protocols established for the PUCT EM&V team for reporting claimed and evaluated impacts. Although quality control is a function of all evaluation stages (e.g., populating the EM&V database, sampling, analysis), this appendix focuses on the QA/QC processes within the reporting stage. A QA/QC team, which will be led by the Tetra Tech reporting lead, will be developed and accountable for ensuring all QA/QC protocols are being followed.

Below we summarize the specific activities that will be subject to QA/QC processes. Note that these QA/QC processes focus on the accuracy of data; this section does not address methodological issues.

Accuracy of ex-ante program data. The EM&V team is housing data, analysis, and reporting functions within the EM&V database. Data will be provided by program implementers, read into the database in raw form, and organized for analysis. The database centrally stores the claimed (ex-ante) savings, which will be used for sampling and reporting of those claimed savings. Data will be provided to the EM&V team quarterly. The EM&V team will characterize the data received in terms of energy and demand savings and participants served, and report the information within the detailed research plans. These detailed research plans will be delivered to the utilities for review and confirmation that the population data is accurate. Inaccurate population data may indicate missing data, errors in the data importation process, or misunderstanding of the data fields.

- Responsibility: program leads
- Accountability: QA/QC team
- Consulted: utility staff, implementation contractors, and EM&V project manager

Application of verification rates and NTG ratios. The impacts will be generated in the EM&V database. The database will categorize measure-level information in the format it was provided to the EM&V team per the data acquisition process. Although projects may be sampled and verified at the measure level, the EM&V team will conduct impact evaluations to obtain and report verification and NTG estimates at the utility and program type level, which will then be aggregated and reported at the program group level.

These impact estimates will be provided by the program leads and stored in two locations. First, the program leads will enter the impact results within an Excel tracking sheet stored on the SharePoint site. The Excel tracking sheet will include the following fields—PY, utility, program group, program type, measure group, program lead, verification rate, NTG ratio, report source of verification rate, report source of NTG ratio, and modification date. *Only one sheet will maintain current impact information.* Should data be updated throughout the process, the outdated records will be moved to a separate worksheet within that file. Doing so will ensure one sheet will maintain the correct rates and that any modifications are documented, including the reason for the modification.

Second, the EM&V database will include an interface where program leads will directly enter their impact results. These results will then be stored and applied against the claimed savings to calculate the evaluated gross and evaluated net results for the annual reporting.

By creating a two-stage impact reporting process, the EM&V team builds a point of verification of the data into the process. The evaluated and net savings results will be directly calculated out of the EM&V database using the rates supplied within the web interface. The EM&V team will then verify that the results are as expected using the values documented within the Excel impact reporting file. Should the results differ, the QA/QC team will be able to refer to the original source to verify the results.

- Responsibility: program leads
- Accountability: QA/QC team
- Consulted: impact leads, EM&V data lead, and project manager

Accuracy of reported savings. As documented in the report outline, program impacts will be aggregated and reported in various ways. At the most aggregate level, the data will be reported by program group overall and then by utility. At the most granular level, the data will be reported by program group for each utility. The annual report will, therefore, represent impacts in over 100 tables. It will be critical to spend considerable time conducting QA/QC against those reported values.

The EM&V database will calculate the full year claimed savings by utility, program type, and program group. Although claimed savings will be documented in quarterly detailed research plans, adjustments made in claimed savings are likely to occur throughout the year. Therefore, it will be necessary to calculate the full PY claimed savings and verify our results against the utility claimed data, which will be reported to the PUCT. The EM&V team will request that the utilities provide their draft claimed savings to verify against the reported claimed savings within the EM&V database. Any differences in the evaluation and utility claimed savings would be clearly documented within the report.

All results tables will be cross-referenced to ensure the results true-up and are consistent with each other. For example, the sum of all residential MTPs evaluated net savings documented within the utility-specific sections should equal the residential MTP results captured in Volume I. The QA/QC team will develop a checklist of tables to be cross-checked, and against which sources, and will systematically go through this checklist throughout the report proofing process.

Although not a specific QA/QC function, the team's development of these reporting functions with the overarching goal of ensuring transparency will inherently allow for ad hoc QA/QC checks by the PUCT, utilities, implementation contractors, or other interested parties. For example, the EM&V database can export results and resulting calculations within easy-to-use Excel files. In addition, impact-related reports will tie back to results clearly for a secondary review.

- Responsibility: utilities (for providing claimed savings) and program leads (for verifying claimed impacts provided)
- Accountability: QA/QC team (for final review and cross-checks of impact tables)
- Consulted: impact leads, EM&V data lead, utilities, and EM&V project manager