

Public Utility Commission of Texas

FINAL Volume 2. Utility-Specific Energy Efficiency Portfolio Report Program Year 2021





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GLOSSARY: ACRONYMS/ABBREVIATIONS/DEFINITIONS

Acronym	Description
AC	Air conditioner
AEP Texas	American Electric Power Texas
AHRI	Air Conditioning, Heating, and Refrigeration Institute
CF	Coincidence factor
C&I	Commercial and industrial
CMTF	Commercial market transformation program
CNP	CenterPoint Energy Houston Electric, LLC
CSOP	Commercial standard offer program
DHP	Ductless heat pump
DLC	DesignLights Consortium
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
EUL	Estimated useful life
EUMMOT	Electric Utility Marketing Managers of Texas
GSHP	Ground-source heat pump
HCIF	Heating/cooling interactive factor
HOU	Hours of use

Acronym	Description
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
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
Oncor	Oncor Electric Delivery Company LLC
PUCT	Public Utility Commission of Texas
PV	Photovoltaics
PY	Program year
QA/QC	Quality assurance/quality control
QPL	Qualified Products List
RCx	Retro-commissioning
RFP	Request for proposal
RMTMP	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
SWEPSCO	Southwestern Electric Power Company
TMY	Typical meteorological year
TEESI	Texas Energy Engineering Services, Inc.
TNMP	Texas-New Mexico Power Company

Acronym	Description
TRM	Technical reference manual
WACC	Weighted average cost of capital
Xcel Energy SPS	Xcel Energy Southwest Public Service, Inc.

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) 2021 (PY2021). It is a companion document to Volume 1 of the Statewide Energy Efficiency Portfolio Report. A summary report, *2021 Energy Efficiency Accomplishments*, is also available at www.puc.texas.gov.

PY2021 is the tenth program year evaluated as part of the statewide EM&V effort. The PY2021 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 provides 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 measurement and verification (M&V) information.

The PY2021 EM&V plans¹ 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 and PUCT and Texas utilities' priorities,
- prior EM&V results, and
- known and anticipated changes in the markets in which the programs operate.

¹ Public Utility Commission of Texas EM&V Plans for Texas Utilities' Energy Efficiency and Load Management Portfolios—Program Year 2021, June 2021.

1.1 REPORT ORGANIZATION

Section 1.2 summarizes the evaluation approach; Sections 2.0 through 9.0 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 methodology are in Appendix B. The EM&V team's quality assurance plan for the reported evaluated savings is in Appendix C.

Detailed desk reviews are provided to utilities in separate documents.

1.2 EVALUATION APPROACH

This section discusses the PY2021 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 PY2021 program data were 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 assess the accuracy of the claimed savings further.

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 believed to contain the true population quantity with some stated level of confidence. The confidence level is the probability that the interval includes 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 ten percent, then the interval is 530 \pm 53 kWh.

It is essential to provide both the precision and corresponding confidence levels in reporting estimates from a sample. In general, high confidence levels 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 precision statement 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. 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 less uncertain when 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 and census reviews of residential deemed savings and load management savings.

1.2.1.1 Tracking System and Desk Reviews

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 for each residential program. 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.

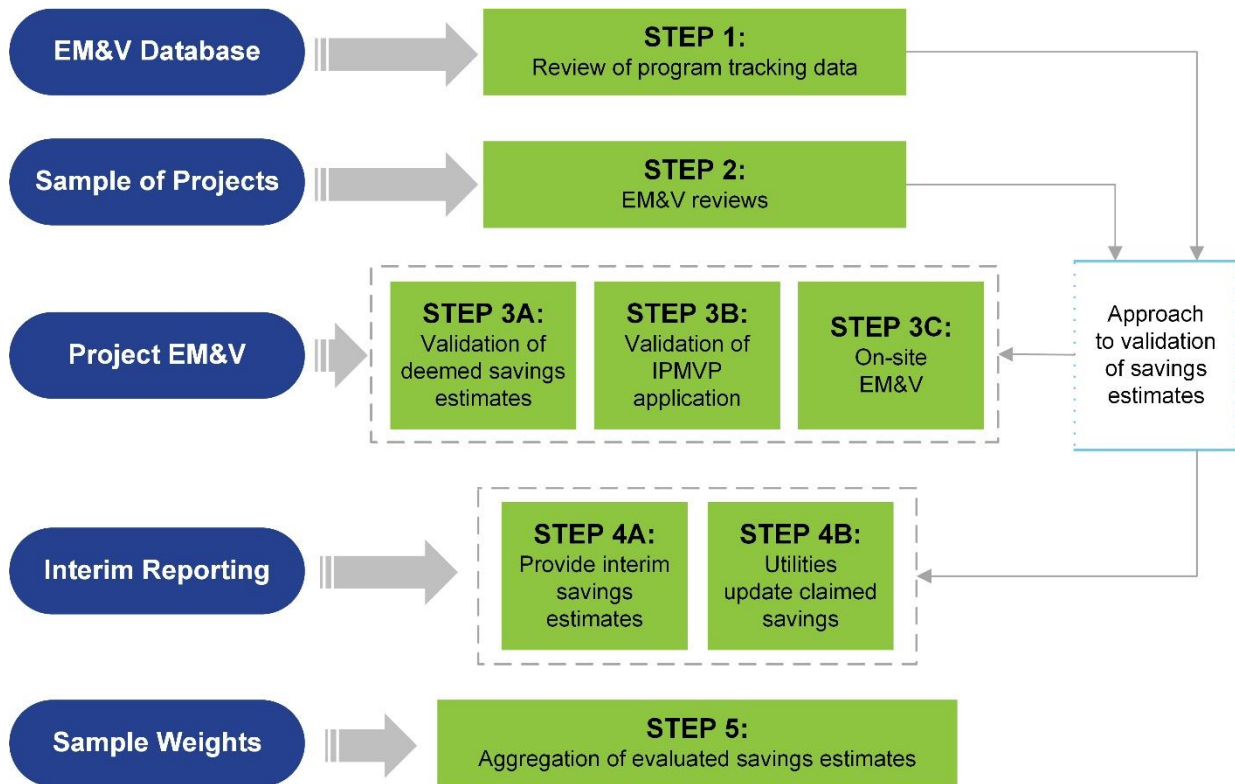
Our review accomplished two primary objectives. First, it ensured that the measures installed were consistent with those listed in the tracking system. Second, the desk reviews verified that the savings estimates in the tracking system were consistent with the savings calculated in the deemed calculation 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 Realization Rates

The evaluated savings are based on project-level realization rate calculations that are then weighted to represent program-, sector-, and portfolio-level realization rates. These realization rates incorporate any adjustments for incorrect application of deemed savings values, any equipment details determined through the tracking system, desk reviews, and primary data collected by the EM&V team. For example, baseline assumptions or hours of use may be corrected through the evaluation review and thus affect the realization rates. Utilities have the opportunity to adjust claimed savings based on interim findings on their evaluation savings, thereby providing an opportunity for realization rates to be close to 100 percent. A flow chart of the realization rate calculations is provided in Figure 1.

Figure 1. Realization Rate Flowchart



1.2.1.3 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. The documentation included completed savings calculators, customer invoices, pre- and post-inspection reports, and equipment cut sheets for nonresidential programs. The documentation provided all inputs needed to replicate the savings calculations based on the deemed savings manual or the approved calculation method and supporting materials for programs.

Limited documentation is defined as the documentation 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 PY2021 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 and demand savings	Measure type	EM&V database
Summer and 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	Program/portfolio	EM&V team budgets
Performance bonus earned in the program year ²	Portfolio	Energy efficiency cost recovery factor (EECRF)
Avoided costs	Statewide	PUCT (utilities)
Weighted average cost of capital (WACC)	Utility	Utilities
Line loss factor (non-ERCOT ³ utilities only)	Utility	Utilities
Realization rates	Program	Evaluation results

The EM&V team conducted PY2021 cost-effectiveness tests separately using claimed gross savings and evaluated gross savings. The model produces results at the portfolio, program category⁴, and program levels.

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

² Performance bonuses as an input into cost-effectiveness testing came into effect in 2012.

³ Electric Reliability Council of Texas.

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

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.

Also, the EM&V team reported the cost-per-lifetime kilowatt-hour and kilowatt. Cost per lifetime 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 before drafting the Annual Statewide Portfolio Report. The impact reports allow 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.

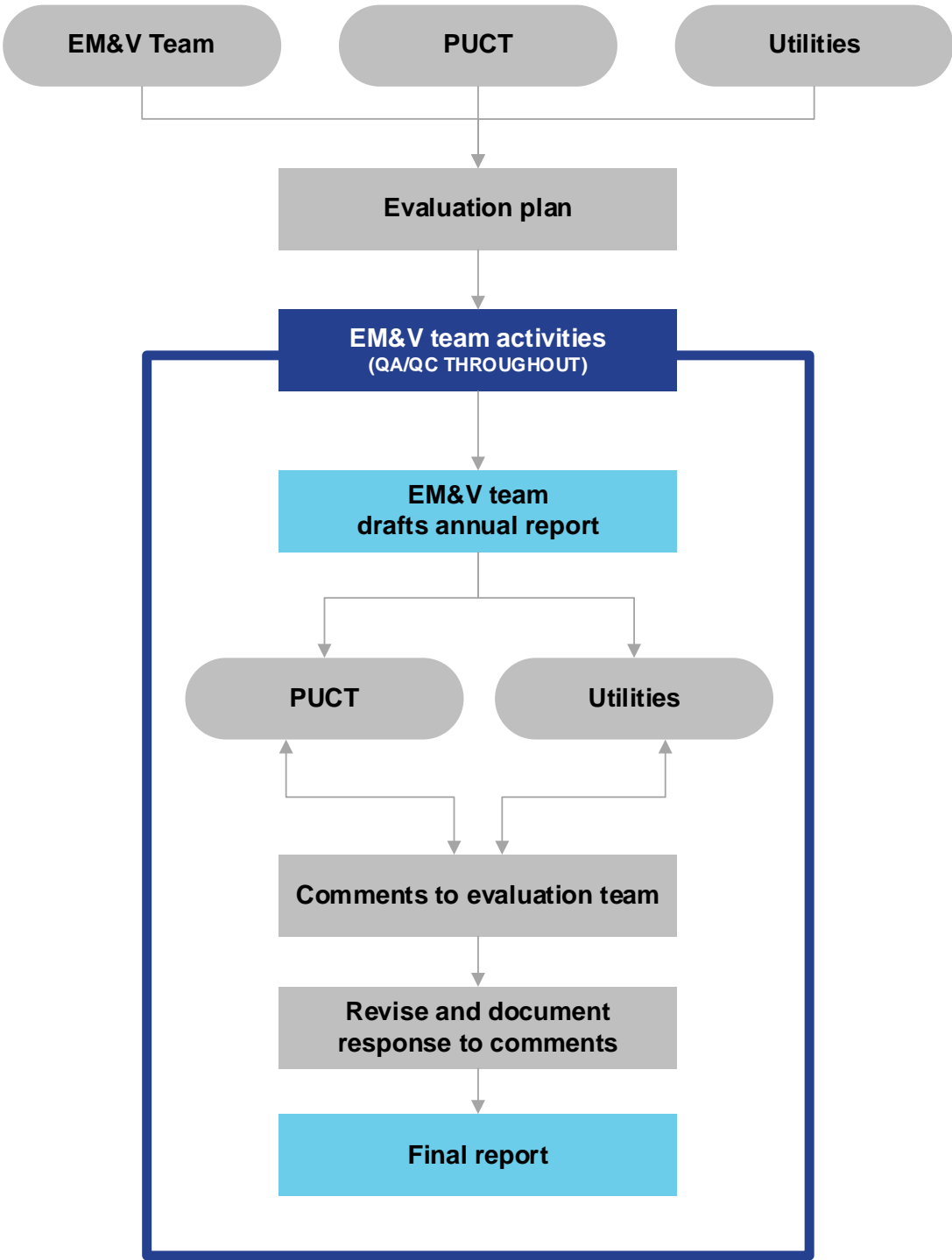
For PY2021, the metrics to be used as the basis for recommendations in the reports are the programs' gross savings realization rate and associated program documentation score; tracking system and interval meter data reviews; desk reviews; on-site M&V findings, including site-specific realization rates; and the 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 utility, program categories and types, measure types, or sectors. QA and QC are conducted to ensure that results 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.

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 Energy Efficiency Implementation Project (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 IMPACT EVALUATION RESULTS

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

2.1 KEY FINDINGS

2.1.1 Evaluated Savings

AEP Texas' evaluated savings for program year (PY) 2021 were 45,307 in demand (kilowatt, kW) and 83,701,765 in energy (kilowatt-hour, kWh) savings. The overall kilowatt and kilowatt-hour portfolio realization rates are approximately 100 percent. AEP Texas was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (see Table 5), supporting healthy realization rates.

Table 2 shows the claimed and evaluated demand savings for AEP Texas's portfolio and broad customer sector and program categories. Load management results are based on census reviews, and therefore precisions calculations are not applicable (N/A).

Table 2. AEP Texas PY2021 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%	45,311	45,307	100.0%	N/A
Commercial	28.8%	13,068	13,068	100.0%	N/A
Residential	20.5%	9,273	9,273	100.0%	N/A
Low-income	2.9%	1,309	1,309	100.0%	N/A
Load management*	47.8%	21,647	21,644	100.0%	N/A
Pilot	0.0%	14	14	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 Texas' portfolio and broad customer sector and program categories for PY2021.

Table 3. AEP Texas PY2021 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%	83,701,769	83,701,765	100.0%	N/A
Commercial	60.6%	50,685,236	50,685,236	100.0%	N/A
Residential	36.3%	30,418,168	30,418,168	100.0%	N/A
Low-income	2.9%	2,396,531	2,396,531	100.0%	N/A
Load management*	0.0%	21,647	21,644	100.0%	N/A
Pilot	0.2%	180,186	180,186	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.

A program documentation score of *good*, *fair*, or *limited* is included in program-level realization rates, as discussed in Section 1.2.1.3. 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 improvement identified. A score of *limited* indicates program documentation improvements across more individual programs or high savings programs have been identified. AEP Texas received *good* documentation scores for all evaluated programs, except the Open MTP and Hard-to-Reach SOP, which received a *fair* documentation score.

2.1.2 Cost-Effectiveness Results

AEP Texas' overall portfolio had a cost-effectiveness score of 3.5, or 3.8 excluding low-income programs.

The more cost-effective programs were the SCORE/CitySmart MTP and the Commercial Standard Offer Program (SOP); the less cost-effective programs were the Load Management SOP and the Residential Pool Pump Pilot Market Transformation Program (MTP). All of AEP Texas' programs were cost-effective in 2021.

The lifetime cost of evaluated savings was \$0.018 per kWh and \$14.49 per kW.

Table 4. AEP Texas Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total portfolio	3.48	3.48	3.12
Total portfolio excluding low-income programs	3.80	3.80	3.39
Commercial	5.13	5.13	4.59
Commercial Solutions MTP	5.30	5.30	4.66
Commercial SOP	6.13	6.13	5.56
SCORE/CitySmart MTP	5.59	5.59	4.92
CoolSaver SM A/C Tune-Up MTP	5.47	5.47	4.37
SMART Source SM Solar PV MTP	4.31	4.31	4.35
Open MTP	2.88	2.88	2.73
Residential	2.81	2.81	2.48
Hard-to-Reach SOP	2.55	2.55	2.55
SMART Source SM Solar PV MTP	5.17	5.17	5.22
Residential SOP	2.36	2.36	2.15
CoolSaver SM A/C Tune-Up MTP	3.09	3.09	2.47
High-Performance New Homes MTP	3.83	3.83	2.68
Low-income	1.92	1.92	1.92
Targeted Low-Income Weatherization*	1.92	1.92	1.92
Load management	1.71	1.71	1.71
Load Management SOP	1.71	1.71	1.71
Pilot	1.12	1.12	0.94
Residential Pool Pump Pilot MTP	1.12	1.12	0.94

* The low-income program is evaluated using the savings-to-investment ratio (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 Texas' June 1 filing. There may be differences between evaluated and claimed savings that did not result in a recommended adjustment because the difference is less than five percent.

Table 5. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF⁵ Filing)

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial Solutions MTP	-5.40	-17,998.30
Commercial SOP	-1.20	-10,488.00
Open MTP	-0.20	-2,912.30
SCORE/CitySmart MTP	-80.00	70,946.00
Hard-to-Reach SOP	0.00	171.40
Targeted Low-Income Weatherization	0.20	-46.90
Residential SOP	0.10	17.00
Total	-86.50	39,688.90

2.3 DETAILED FINDINGS—COMMERCIAL

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
3.6%	1,650	1,650	100.0%	9.1%	7,631,163	7,631,163	100.0%	Good

Completed desk reviews*	On-site M&V visit
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 PY2021 Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

The EM&V team adjusted the claimed savings for four of the projects. Two projects had less than five percent adjustments, while two projects had adjustments of greater than five percent compared to the originally claimed savings. AEP Texas accepted the evaluated results and matched the claimed savings to those of the evaluations for the four projects; therefore, the final program realization rate is 100 percent for kilowatt and kilowatt-hour. Further details of the EM&V findings are provided below.

⁵ Energy efficiency cost recovery factor.

Participant ID 1387850: The energy efficiency project included interior LED lighting retrofits of a retail store. During the desk review and on-site M&V visit, the EM&V team adjusted the air conditioning type for a few line items from *refrigerated air* to *none*, based on on-site observations. Several adjustments to lighting quantities were also made, along with the wattage of one light to match the DesignLights Consortium (DLC) Qualified Products List (QPL). These adjustments decreased peak demand (kilowatt) savings slightly and resulted in a realization rate of 99 percent. The adjustments also decreased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1388570: The energy efficiency project included interior and exterior LED lighting retrofits of a retail store. During the desk review, the EM&V team adjusted the air conditioning type for the walk-in cooler areas from *refrigerated air* to *medium temperature refrigeration*, based on the post-retrofit photographs. This adjustment increased peak demand (kilowatt) savings slightly but resulted in a realization rate that rounded to 100 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 101 percent.

Participant ID 1477936: The energy efficiency project included interior and exterior LED lighting retrofits of a retail store. During the desk review and on-site M&V visit, the EM&V team adjusted the wattages of one light to match the DLC QPL and the quantities of exterior lighting fixtures based on on-site observations. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 104 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 108 percent.

Participant ID 1478080: The energy efficiency project installed and optimized controllers and a building automation system at an office. During the desk review, the EM&V team identified that the participant installed a prescribed energy efficiency project in the post-install measurement period and removed the pro-rated energy savings claimed by that project from the identified measured savings. Also, the analysis of the energy savings was adjusted to a custom calculation method which better estimated savings than the measurement and verification method in Volume 4 of the TRM. These two adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 88 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 22 percent.

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) for the eight 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-install and post-install inspection notes, project savings calculators, and photographic documentation of existing and new equipment. The measurement and verification project provided sufficient documentation to identify energy savings through alternate methods. 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
7.0%	3,184	3,184	100.0%	22.0%	18,413,777	18,413,777	100.0%	Good

Completed desk reviews* ⁶	On-site M&V visit
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 PY2021 Commercial SOP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

The EM&V team adjusted the claimed savings for four projects. All four projects had less than five percent adjustments compared to the originally claimed savings. AEP Texas accepted the evaluated results and matched the claimed savings to those of the evaluations for both projects; therefore, the final program realization rate is 100 percent for kilowatt and kilowatt-hour. Further details of the EM&V findings are provided below.

Participant ID 1472346: The energy efficiency project involved the installation of LED lighting and HVAC equipment at a new construction K–12 school. During the desk review, the EM&V team adjusted the cooling capacities of the installed HVAC units to match the capacities on the Air Conditioning, Heating, and Refrigeration Institute (AHRI) certifications QPL. The fixture wattages for lighting fixtures within the building were also adjusted to match the DLC QPL. These adjustments slightly increased peak demand (kilowatt) savings but in a realization rate that rounded to 100 percent. The adjustments decreased energy (kilowatt-hour) savings and resulted in a realization rate of 99 percent.

Participant ID 1472625: The energy efficiency project included interior and exterior LED retrofits at a distribution center. During the desk review and on-site M&V visit, the EM&V team adjusted the fixture wattages for two light fixtures to match the DLC QPL. These adjustments slightly increased peak demand (kilowatt) savings but in a realization rate that rounded to 100 percent. The adjustments also slightly increased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1488669: The energy efficiency project included interior and exterior LED retrofits at a warehouse facility. During the desk review and on-site M&V visit, the EM&V team adjusted the fixture wattages for two light fixtures to match the DLC QPL. In addition, lighting controls were adjusted based on on-site observations. These adjustments decreased peak demand (kilowatt) savings and in a realization rate of 98 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 97 percent.

⁶ Two projects were located on the same campus and were sampled separately, although are reported under one EM&V participant.

Participant ID 1489610: The energy efficiency project installed LED lighting and energy-efficient HVAC equipment at a new construction school and soccer facility. During the desk review, the EM&V team adjusted the full-load and part-load efficiency ratings to match AHRI certifications. In addition, the lighting wattages for one lighting fixture were adjusted to match the DLC QPL. These adjustments slightly decreased peak demand (kilowatt) savings but in a realization rate that rounded to 100 percent. The adjustments increased energy (kilowatt-hour) savings and resulted in a realization rate of 101 percent.

Documentation Score

The EM&V team verified key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for both projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation at these sites included invoices, QPL qualifications, pre-install and post-install inspection notes, project savings calculators, and photographic documentation of existing and new equipment. 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 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%	2,284	2,284	100.0%	11.5%	9,645,175	9,645,175	100.0%	Good

Completed desk reviews*	On-site M&V visit
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 PY2021 SCORE/CitySmart MTP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

The EM&V team adjusted the claimed savings for two projects. One project had an adjustment of greater than five percent, while the other project had an adjustment of less than five percent compared to the originally claimed savings. AEP Texas 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 100 percent for kilowatt and kilowatt-hour. Further details of the EM&V findings are provided below.

Participant ID 1387915: The energy efficiency project was the second claim on a project to adjust the thermostats and building automation system programming at a junior high school. During the desk review and on-site M&V visit, the EM&V team found that the installed project saved energy, although not as much as originally expected. The EM&V team identified energy (kilowatt-hour) savings which increased the energy savings from zero to 70,775 kWh. The PY2020 claimed peak energy savings equaled the maximum savings calculated; therefore, the PY2021 peak demand (kilowatt) savings was reduced to zero kW, resulting in a zero percent realization rate.

Participant ID 1501000: The energy efficiency project included interior and exterior LED retrofits at an elementary school and administration office. During the desk review, the EM&V team adjusted the air conditioning type for an interior fixture in a walk-in cooler from *refrigerated air to medium temperature refrigeration (33 to 41°F)* to match the building area descriptions. These adjustments slightly increased peak demand (kilowatt) savings but in a realization rate that rounded to 100 percent. The adjustments also slightly increased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, Air Conditioning, Heating, and Refrigeration Institute (AHRI) certifications) for all the projects that had desk reviews because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications, equipment specifications, pre-install and post-install 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. The M&V data was easily identified and supported with reporting to determine the impact of various activities. 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*.

2.3.4 Open Market Transformation Program (MTP) (Medium Evaluation Priority)

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
2.7%	1,216	1,216	100.0%	6.1%	5,117,185	5,117,185	100.0%	Fair

Completed desk reviews*	On-site M&V visit
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 PY2021 Open MTP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

The EM&V team adjusted the claimed savings for six projects. One project had adjustments of greater than five percent, while five projects had adjustments of less than five percent compared to the originally claimed savings. AEP Texas 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 100 percent for kilowatt and kilowatt-hour. Further details of the EM&V findings are provided below.

Participant ID 1385222: The energy efficiency project included interior and exterior LED lighting retrofits at a dental facility. During the desk review and on-site M&V visit, the EM&V team adjusted the building type from *office* to *health care: outpatient* because the dental office has diagnostic and laboratory equipment. This adjustment decreased peak demand (kilowatt) savings and in a realization rate of 87 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 92 percent.

Participant ID 1385334: The energy efficiency project included interior LED lighting retrofits at a retail enclosed strip mall and warehouse. During the desk review, the EM&V team adjusted the building type from *warehouse: non-refrigerated* and *retail: all non-24 hour retail excluding mall and strip* to *service: excluding food* based on the photos showing the warehouse was a service facility to refurbish trailers, and the office was supporting the service area. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 109 percent. The adjustments decreased energy (kilowatt-hour) savings and resulted in a realization rate of 97 percent.

Participant ID 1387841: The energy efficiency project included interior LED lighting retrofits at an office and industrial warehouse. During the desk review, the EM&V team adjusted the wattage of light fixtures to match the DLC QPL. These adjustments slightly decreased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. The adjustments also slightly decreased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1388321: The energy efficiency project included air infiltration measures at a retail strip mall. During the desk review and on-site M&V visit, the EM&V team adjusted the gap widths and door seal lengths based on on-site observations. These adjustments slightly decreased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. The adjustments also slightly decreased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1388427: The energy efficiency project included interior LED lighting retrofits at a retail store. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of one light fixture to match the DLC QPL. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 101 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 101 percent.

Participant ID 1477673: The energy efficiency project included interior LED lighting retrofits at a retail store. During the desk review, the EM&V team adjusted the wattage of one light fixture to match the DLC QPL. These adjustments slightly decreased peak demand (kilowatt) savings but in a realization rate that rounded to 100 percent. The adjustments also slightly decreased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Documentation Score

The EM&V team was unable to verify key inputs and assumptions for several projects in this program. Missing documentation included post-install inspection notes, equipment specification sheets, and DLC certifications. The building shell projects also were missing the calculation sheets and key assumptions and received a limited documentation score. Overall, the photo quality was acceptable, although one project had poor photos, which made verification difficult in the absence of post-inspection notes. 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*.

2.4 DETAILED FINDINGS—RESIDENTIAL

2.4.1 Residential 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%	2,963	2,963	100.0%	16.8%	14,095,317	14,095,317	100.0%	Good

Completed desk reviews*
8

*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 PY2021 Residential SOP evaluation efforts focused on desk reviews. The number of completed desk reviews for this program is listed above. Six desk reviews were completed to check that measure data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated in accordance with the TRM.

The EM&V team adjusted the claimed savings for two projects. Both projects had less than five percent adjustments compared to the originally claimed savings. AEP Texas accepted the evaluated results and matched the claimed savings to those of the evaluations for all projects. Therefore, the final program realization rate is 100 percent for kilowatt and kilowatt-hour. Further details of the EM&V findings are provided below.

Participant ID 1470518: The project included the installation of a low-flow showerhead, LED lighting, air purifier, advanced powerstrip, and duct sealing. During the desk review, the EM&V team found that the tracked 1 gallon per minute (GPM) flow rate did not match the 1.5 GPM flow rate in the documentation. The EM&V team adjusted the flow rate resulting in a decrease in savings. Overall, the adjustments resulted in project-level realization rates of 96.0 percent and 97.1 percent for demand and energy savings, respectively.

Participant ID 1489702: The project included the installation of a new central air conditioner system. During the desk review, the EM&V team found that the tracked age of equipment, 18 years, did not match the 16 years in the documentation. The EM&V team adjusted the age of existing equipment resulting in a slight increase in savings. Overall, the adjustments resulted in project-level realization rates of 104.6 percent and 103.4 percent for demand and energy savings, respectively.

Documentation Score

The EM&V team was able to verify key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects that had desk reviews. Project documentation included customer agreement, photos, specification sheets, certifications, and field notes. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

2.4.2 Hard-to-Reach 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
5.0%	2,277	2,277	100.0%	5.9%	4,931,719	4,931,719	100.0%	Fair

Completed desk reviews*	Completed 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 PY2021 Hard-to-Reach SOP evaluation efforts focused on desk reviews and on-site M&V. The number of sampled and completed desk reviews and site visits for this program are listed above.

Overall, the EM&V team assessed ex-ante claimed energy and demand savings across the following two activities:

- For a sample of projects, desk reviews were completed to ensure that data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated per the TRM.
- On-site M&V was completed for a sample of projects to verify that measures remained installed and matched project documentation.

The EM&V team adjusted the claimed savings for one project. The project had less than five percent adjustments compared to the originally claimed savings. AEP Texas accepted the evaluated results and matched the claimed savings to those of the evaluations for the one project. Therefore, the final program realization rate is 100 percent for kilowatt and kilowatt-hour. Further details of the EM&V findings are provided below.

Participant ID 1489296: The project included the installation of LED lighting, advanced power strip, air infiltration, and duct sealing. During the desk review, the EM&V team found that the tracked 5 watts lighting efficiency did not match the 9 watts lighting efficiency in the documentation. The EM&V team adjusted the wattage and resulting in an increase in savings. Overall, the adjustments resulted in project-level realization rates of 102.3 percent and 106.7 percent for demand and energy savings, respectively.

Documentation Score

With desk reviews, the EM&V team verified some key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects. Project documentation included customer agreement, photos, and field notes. There was limited documentation for direct installs such as LEDs and low-flow showerheads. Overall, the EM&V team was mostly satisfied with the project documentation provided and assigned a program documentation score of *fair*.

2.5 DETAILED FINDINGS—LOW-INCOME

2.5.1 Targeted Low-Income Energy Efficiency 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
2.9%	1,309	1,309	100.0%	2.9%	2,396,531	2,396,531	100.0%	Good

Completed desk reviews*	Completed on-site M&V
3	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 PY2021 Targeted Low-Income evaluation efforts focused on desk reviews and on-site M&V. The number of sampled and completed desk reviews and site visits for this program are listed above.

Overall, the EM&V team assessed ex-ante claimed energy and demand savings across the following two activities:

- For a sample of projects, desk reviews were completed to ensure that data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated per the TRM.
- On-site M&V was completed for a sample of projects to verify that measures remained installed and matched project documentation.

The EM&V team adjusted the claimed savings for three projects. The projects had less than five percent adjustments compared to the originally claimed savings. AEP Texas accepted the evaluated results and matched the claimed savings to those of the evaluations for all three projects. Therefore, the final program realization rate is 100 percent for kilowatt and kilowatt-hour. Further details of the EM&V findings are provided below.

Participant ID 1454745: The project included the installation of a new central heat pump system. During the desk review, the EM&V team found that the tracked age of equipment, 11 years, did not match the 10 years in the documentation. The EM&V team also found that the tracked SEER and HSPF efficiencies did not match the documentation. The EM&V team adjusted the age of existing equipment resulting in a slight increase in savings and efficiency of new equipment resulting in a slight decrease in savings. Overall, the adjustments resulted in project-level realization rates of 104.1 percent and 99.6 percent for demand and energy savings, respectively.

Participant ID 1454746: The project included the installation of a new central heat pump system. During the desk review, the EM&V team found that the ex-ante savings were calculated using the default remaining useful life value for an existing heat pump system. However, when the existing system is an air conditioner, the default remaining useful life for an air conditioner system should be used. The EM&V team adjusted the remaining useful life in the ex-post calculation resulting in a slight increase in savings. Overall, the adjustments resulted in project-level realization rates of 100.0 percent and 101.2 percent for demand and energy savings, respectively.

Participant ID 1454780: The project included the installation of a new central heat pump system. During the desk review, the EM&V team found that the tracked age of equipment did not match the age of equipment in the documentation. The EM&V team adjusted the age of equipment in the ex-post calculation resulting in a slight decrease in savings. Overall, the adjustments resulted in project-level realization rates of 100.0 percent and 98.7 percent for demand and energy savings, respectively.

Documentation Score

The EM&V team was able to verify key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects that had desk reviews. Project documentation included customer agreement, photos, specification sheets, certifications, and field notes. Documentation also included low-income certification. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

2.6 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

2.6.1 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
47.8%	21,647	21,644	100.0%	0.0%	21,647	21,644	100.0%	Good

Completed desk reviews*

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 AEP Texas Load Management SOP by applying the technical reference manual (TRM) calculation methodology to interval meter data. The meter data was supplied in 30-minute increments. Load management events in PY2021 occurred on the following dates and times:

- May 27, 2021, from 3:30 p.m. to 4:30 p.m. (scheduled);
- August 20, 2021, from 1:00 p.m. to 2:00 p.m. (scheduled); and
- August 20, 2021, from 5:30 p.m. to 6:30 p.m. (scheduled).

The EM&V team received the interval meter data and a spreadsheet that summarized the event-level savings for the ten sponsors across 89 sites. Thirteen sites did not have any load data associated with them across the scheduled events. All sponsors had at least one site that curtailed during each event.

Since no unscheduled events were called in PY2021, AEP Texas calculated kilowatt savings for each site by applying the kilowatt reduction during the scheduled or test event (each site participated in only one 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 TNMP provided for all sites. The kilowatt savings for each participating site corresponded to the energy reduced during the scheduled event. The kilowatt-hour savings for each participating site were calculated by multiplying the kilowatt reductions by the total number of event hours. Program-level savings were calculated by adding all site-level savings.

The table above shows both the EM&V team (evaluated) and AEP Texas's (claimed) calculated kilowatt and kilowatt-hour savings. No adjustments were made to the program savings; however, a negligible difference in kilowatt and kilowatt-hour was a result of different rounding practices during calculations. Evaluated savings for the TNMP Load Management SOP are 21,644 kW and 21,644 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

2.7 SUMMARY OF LOW EVALUATION PRIORITY PROGRAMS

Table 6 summarizes claimed savings for AEP Texas' low evaluation priority programs in PY2021, including the programs' overall contribution to portfolio savings. Low-priority programs' claimed savings were verified against the final PY2021 tracking data provided to the EM&V team for the EM&V database.

Table 6. PY2021 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)
CoolSaver SM A/C Tune-Up MTP (Commercial)	9.9%	4,497	4,497	100.0%	10.8%	9,015,723	9,015,723	100.0%
SMART Source SM Solar PV MTP (Commercial)	0.5%	237	237	100.0%	1.0%	862,214	862,214	100.0%
High-Performance New Homes MTP	5.0%	2,266	2,266	100.0%	3.9%	3,248,011	3,248,011	100.0%
CoolSaver SM A/C Tune-Up MTP (Residential)	2.9%	1,299	1,299	100.0%	7.8%	6,540,544	6,540,544	100.0%
SMART Source SM Solar PV MTP (Residential)	1.0%	468	468	100.0%	1.9%	1,602,578	1,602,578	100.0%
Residential Pool Pump Pilot MTP	0.0%	14	14	100.0%	0.2%	180,186	180,186	100.0%

3.0 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 priorities for which claimed savings were verified through the evaluation, measurement, and verification (EM&V) database is included.

3.1 KEY FINDINGS

3.1.1 Evaluated Savings

CenterPoint's evaluated savings for program year (PY) 2021 were 211,967 in demand (kilowatt, kW) and 235,257,088 in energy (kilowatt-hour, kWh) savings. The overall kilowatt and kilowatt-hour 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 10), supporting healthy realization rates.

Table 7 shows the claimed and evaluated demand savings for CenterPoint's portfolio and broad customer sector and program categories. Residential and Load management results are based on census reviews, and therefore precision calculations are not applicable (N/A).

Table 7. CenterPoint PY2021 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%	211,966	211,967	100.0%	N/A
Commercial	11.4%	24,177	24,177	100.0%	N/A
Residential	13.2%	27,987	27,987	100.0%	N/A
Low-income	2.2%	4,765	4,765	100.0%	N/A
Load management*	73.1%	155,037	155,038	100.0%	N/A
Pilot	0.0%	0	0	0.0%	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 8 shows the claimed and evaluated energy savings for CenterPoint's portfolio and broad customer sector and program categories for PY2021.

Table 8. CenterPoint PY2021 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%	235,257,091	235,257,088	100.0%	N/A
Commercial	51.2%	122,173,308	122,173,308	100.0%	N/A
Residential	45.2%	103,085,644	103,085,644	100.0%	N/A
Low-income	3.2%	9,068,201	9,068,201	100.0%	N/A
Load management*	0.4%	929,938	929,935	100.0%	N/A
Pilot	0.0%	0	0	0.0%	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.

A program documentation score of *good*, *fair*, or *limited* is included in program-level realization rates, as discussed in Section 1.2.1.3. 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 improvement identified. A score of *limited* indicates program documentation improvements across more individual programs or high savings programs have been identified. CenterPoint received *good* documentation scores for all evaluated programs, except the Smart Source Solar PV MTP, which received a *fair* documentation score.

3.1.2 Cost-Effectiveness Results

CenterPoint’s overall portfolio had a cost-effectiveness score of 4.2, or 4.5 excluding low-income programs.

The more cost-effective programs were Advanced Lighting (both commercial and residential) and CenterPoint Energy High Efficiency Home MTP; the less cost-effective programs were Multi-Family MTP Hard-to-Reach and Commercial High Efficiency Foodservice MTP (Pilot). All of CenterPoint’s programs were cost-effective in 2021.

The lifetime cost of evaluated savings was \$0.015 per kWh and \$12.48 per kW.

Table 9. CenterPoint Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total portfolio	4.19	4.19	3.39
Total portfolio excluding low-income programs	4.53	4.53	3.62
Commercial	4.69	4.69	4.17
Commercial Standard Offer Program	6.18	6.18	5.61
Commercial High Efficiency Foodservice MTP (Pilot)	1.09	1.09	0.87
Commercial MTP (SCORE, Healthcare, Data Center)	3.97	3.97	3.48
Retro-Commissioning MTP	2.10	2.10	1.89
REP MTP (Commercial CoolSaver)	4.34	4.34	3.48
Advanced Lighting Commercial MTP	13.41	13.41	6.71
Residential	5.55	5.55	3.85
Residential & Small Commercial Standard Offer Program	4.44	4.44	4.03
Smart Thermostat Program	4.46	4.46	3.75
Advanced Lighting Residential MTP	13.41	13.41	6.71
Midstream MTP (HVAC and Pool Pump Distributor)	3.37	3.37	2.69
REP MTP (Residential CoolSaver and Efficiency Connection)	2.19	2.19	1.76
Multi-Family MTP Market Rate	4.31	4.31	3.45
CenterPoint Energy High Efficiency Home MTP	6.59	6.59	4.61
Hard-to-Reach Standard Offer Program	2.01	2.01	2.01
Multi-Family MTP Hard-to-Reach	1.07	1.07	1.07
Low-income	3.06	3.06	3.06
Targeted Low-Income MTP (Agencies in Action)*	3.06	3.06	3.06
Load management	1.56	1.56	1.53
Commercial Load Management Standard Offer Program	1.69	1.69	1.69
Residential Load Management Standard Offer Program	1.11	1.11	0.96
Pilot	-	-	-
Smart Home Energy Management System (Pilot)	0	0	0

* The low-income program is evaluated using the savings-to-investment ratio (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 10 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. There may be differences between evaluated and claimed savings that did not result in a recommended adjustment because the difference is less than five percent.

Table 10. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF⁷ Filing)

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial MTP (SCORE, Healthcare, Data Center)	-172.01	-924,060.00
Commercial SOP	-108.00	-606,112.00
Targeted Low-Income MTP (Agencies in Action)	0.00	-1,624.28
Residential & Small Commercial SOP	-1.58	225.00
Total	-281.59	-1,531,571.28

3.3 DETAILED FINDINGS—COMMERCIAL

3.3.1 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
3.5%	7,365	7365	100.0%	17.9%	42,072,018	42,072,018	100.0%	Good

Completed desk reviews*	On-site M&V visit
20	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 PY2021 Commercial MTP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

⁷ Energy efficiency cost recovery factor.

The EM&V team adjusted the claimed savings for 13 projects. Six adjusted projects had adjustments of greater than five percent compared to the originally claimed savings, while seven projects had minor adjustments of less 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; therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1440444: The energy efficiency project included the installation of new lighting controls, new LED lighting fixtures, HVAC controls, and HVAC equipment at a middle school. During the desk review, the EM&V team adjusted the calculation methodology to use monthly regression equations for energy savings. In addition, the demand calculation method was adjusted to the *PDPF Top 20 Hours* method in PY2021 TRM 8.0 Volume 1 for demand savings. These adjustments slightly decreased peak demand (kilowatt) savings and resulted in a realization rate of 82 percent. The adjustments increased energy (kilowatt-hour) savings and resulted in a realization rate of 266 percent.

Participant ID 1440451: The energy efficiency project included interior LED retrofits at a high school. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of one light to match the DesignLights Consortium (DLC) Qualified Products List (QPL). This adjustment slightly increased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. The adjustments also slightly increased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1440452: The energy efficiency project included interior LED retrofits at a high school. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of one light to match the DLC QPL. This adjustment slightly increased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. The adjustments also slightly increased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1534600: The energy efficiency project was installing energy-efficient chillers and computer room air handlers (CRAHs) at a data center. During the desk review, the EM&V team adjusted the cooling load estimate to match the installed equipment. This adjustment decreased peak demand (kilowatt) savings and resulted in a realization rate of 53 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 48 percent.

Participant ID 1534601: The energy efficiency project installed energy-efficient chillers, uninterrupted power units, and computer room air handlers (CRAHs) at a data center. During the desk review, the EM&V team adjusted the estimated cooling load to match the installed equipment. This adjustment decreased peak demand (kilowatt) savings and resulted in a realization rate of 84 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 84 percent.

Participant ID 1534674: The energy efficiency project included interior and exterior LED retrofits at an in-patient hospital. During the desk review, the EM&V team removed several line items of one LED fixture because the post-inspection could not locate the lights. This adjustment decreased peak demand (kilowatt) savings and resulted in a realization rate of 99 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 99 percent.

Participant ID 1534685: The energy efficiency project included central chilling plant optimizations at a large hospital. During the desk review, the EM&V team adjusted the calculation methodology to use the TMY3 data file to determine wet bulb temperature from the relative humidity. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 106 percent. The energy (kilowatt-hour) savings were not adjusted.

Participant ID 1534688: The energy efficiency project included interior LED retrofits at an in-patient hospital. During the desk review, the EM&V team adjusted lighting fixtures from *non-qualified* to *qualified* because they were listed on the DLC QPL. This adjustment decreased peak demand (kilowatt) savings and resulted in a realization rate of 98 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 98 percent.

Participant ID 1536312: The energy efficiency project included the installation of interior and exterior LED lighting at a new construction school auditorium. During the desk review and on-site M&V visit, the EM&V team reduced the gross lighted area to match site observations. The predominant building type was also adjusted from *Education: K-12 with Summer Session, College, University, Vocational, and Day Care* to *Education: K-12 without Summer Session*, based on the post-inspection notes and the site representative. Finally, two fixture wattages were adjusted to match the DLC QPL. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 65 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 51 percent.

Participant ID 1548524: The energy efficiency project included LED retrofits and HVAC upgrades at a high school. During the desk review, the EM&V team adjusted the calculation methodology to use monthly regression equations for energy savings and to match the *PDPF Top 20 Hours* method in PY2021 TRM 8.0 Volume 1 for demand savings. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 110 percent. The energy (kilowatt-hour) savings was not adjusted.

Participant ID 1548568: The energy efficiency project included interior and exterior LED retrofits at a parking garage. During the desk review, the EM&V team adjusted the lighting controls from *multiple controls* to *occupancy* because documentation of daylight on/off sensors with the occupancy sensors could not be located, and post-install inspection photos showed lighting fixtures being on during the daytime. This adjustment decreased peak demand (kilowatt) savings and resulted in a realization rate of 97 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 97 percent.

Participant ID 1548583: The energy efficiency project included exterior LED retrofits at a school district transportation facility. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of one light to match the DLC QPL. This adjustment slightly increased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 104 percent.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for the 20 projects that had desk reviews because sufficient documentation was provided for the sites. Project documentation included M&V plans, invoices, QPL qualifications, pre-inspection 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. There were a few projects where lighting quantities differed between the post-inspection, invoice, engineering drawings, and/or the calculation file. Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. 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
5.9%	12,474	12,474	100%	26.7%	62,724,963	62,724,963	100.0%	Good

Completed desk reviews*	On-site M&V visit
26	13

* 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 PY2021 Large Commercial SOP evaluation efforts focused on desk reviews and on-site M&V visits. The sample of completed desk reviews and on-site M&V visits for this program is listed above.

The EM&V team adjusted the claimed savings for nine projects. Four projects had adjustments of greater than five percent compared to the originally claimed savings. Five projects had adjustments of less 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 nine projects; therefore, the final program realization rate is 100 percent for kilowatt and kilowatt-hour. Further details of the EM&V findings are provided below.

Participant ID 1435952: The energy efficiency project included interior and exterior LED retrofits at a metal cutting facility. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of one light fixture to match the DLC QPL. In addition, the lighting controls were adjusted from *daylighting multiple-step dimming* to *occupancy* based on on-site observations. This adjustment decreased peak demand (kilowatt) savings and resulted in a realization rate of 99 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 99 percent.

Participant ID 1435958: The energy efficiency project included interior and exterior LED retrofits in a distribution warehouse. During the desk review and on-site M&V visit, the EM&V team adjusted the air conditioning type from *refrigerated air* to *none* based on on-site observations. This adjustment decreased peak demand (kilowatt) savings and resulted in a realization rate of 92 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 96 percent.

Participant ID 1478168: The energy efficiency project included interior LED retrofits at a used car dealership and shop. During the desk review and on-site M&V visit, the EM&V team adjusted the wattages for a light fixture to match the DLC QPL. The air conditioning type for one building area was also adjusted from *refrigerated air* to *none* based on on-site observations. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 104 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 104 percent.

Participant ID 1478203: The energy efficiency project included interior and exterior LED retrofits at an auto body shop. During the desk review and on-site M&V visit, the EM&V team added additional LED tubes and replaced fluorescent lamps since the post-inspection was completed. The air conditioning type for the shop was also adjusted from *refrigerated air* to *none* based on on-site observations. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 122 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 119 percent.

Participant ID 1478211: The energy efficiency project included interior and exterior LED retrofits at an auto body shop. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage for one light to match the DLC QPL. Post retrofit quantities of LED tubes were also adjusted based on on-site observations. Finally, the air conditioning type for the wash bay and paint areas was adjusted from *refrigerated air* to *none* based on on-site observations. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 109 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 109 percent.

Participant ID 1478227: The energy efficiency project included interior and exterior LED retrofits at a commercial office and non-refrigerated warehouse. During the desk review, the EM&V team adjusted the wattage of lighting fixtures to match the DLC QPL. One lamp is adjusted from *non-qualified* to *Energy Star-qualified* based on the provided ENERGY STAR® certification. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 103 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 103 percent.

Participant ID 1478246: The energy efficiency project included interior and exterior LED retrofits at a retail store. During the desk review, the EM&V team adjusted the wattage for one light fixture to match the DLC QPL. This adjustment slightly increased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. The adjustments also slightly increased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1534553: The energy efficiency project involved the installation of LED lighting and energy-efficient air conditioning units and heat pumps on a new construction distribution center. During the desk review, the EM&V team added one additional heat pump to the inventory, adjusted HVAC units from *air conditioning units* to *heat pump* based on their equipment nameplate photos, and adjusted the cooling capacity, cooling full-load, and cooling part-load efficiencies for one unit to match its AHRI certification. In the lighting project, the building exterior zone was adjusted from three to two because satellite images showed the surrounding area to be rural with an intention to build up to light industrial. One light fixture was adjusted to be *non-qualified* because it was not identified on the DLC QPL. One light fixture wattage was adjusted to match the DLC QPL. Finally, the Cool Roofs energy efficiency measure was removed because the building is a new construction building and not a commercial retrofit. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 96 percent. The adjustments also slightly decreased energy (kilowatt-hour) savings and resulted in a realization rate of 91 percent.

Participant ID 1534554: The energy efficiency project included interior and exterior LED retrofits at a retail store. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage for several lights to match the DLC QPL. These adjustments slightly decreased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. The adjustments also slightly decreased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Documentation Score

The EM&V team mostly verified key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for the 26 projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation at these sites included invoices, QPL qualifications, pre-install and post-install inspection notes, project savings calculators, specification sheets, and photographic documentation of existing and new equipment. A few projects had discrepancies in lighting quantities between inspection sheets and invoices. 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*.

3.3.3 Retro-Commissioning Market Transformation Program (MTP) (Medium Evaluation Priority)

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%	665	0	0.0%	4.3%	10,039,396	0	0.0%	Unranked

Completed desk reviews*
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 PY2021 Retro-Commissioning MTP evaluation efforts were allocated to other high and medium priority commercial programs due to delays in the availability of project data and limited program participation.

The EM&V team did not adjust the claimed savings or review the documentation to provide realization rates or documentation scores.

3.4 DETAILED FINDINGS—RESIDENTIAL AND SMALL COMMERCIAL

3.4.1 Residential and Small 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
0.1%	277	277	100.0%	0.4%	897,261	897,261	100.0%	Good

Completed desk reviews*
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 PY2021 Residential and Small Commercial SOP evaluation efforts focused on desk reviews. Six desk reviews were completed to check that measure data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated in accordance with the TRM.

The EM&V team adjusted the claimed savings for four projects. The four projects had adjustments of greater than five percent compared to the originally claimed savings. CenterPoint accepted the evaluated results and matched the claimed savings for the four projects with significant adjustments; therefore, the final program realization rates are 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1440557: The project included the installation of a new central air conditioner system. During the desk review, the EM&V team found that the installed unit's full load efficiency, EER, was below the required EER by the TRM. The EM&V team adjusted accordingly, resulting in a decrease in demand savings. Overall, the adjustments resulted in project-level realization rates of zero percent and 100 percent for demand and energy savings, respectively.

Participant ID 1440561: The project included the installation of a new central air conditioner system. During the desk review, the EM&V team found that the installed unit's full load efficiency, EER, was below the required EER by the TRM. The EM&V team also found that the capacity of the installed system was higher than the capacity in the tracking data used to calculate ex-ante savings. The EM&V team adjusted accordingly, resulting in a decrease in demand savings and an increase in energy savings. Overall, the adjustments resulted in project-level realization rates of zero percent and 114.2 percent for demand and energy savings, respectively.

Participant ID 1440563: The project included the installation of a new central air conditioner system. During the desk review, the EM&V team found that the installed unit's full load efficiency, EER, was below the required EER by the TRM. The EM&V team adjusted accordingly, resulting in a decrease in demand savings. Overall, the adjustments resulted in project-level realization rates of zero percent and 100 percent for demand and energy savings, respectively.

Participant ID 1482053: The project included the installation of a new central air conditioner system. During the desk review, the EM&V team found that the installed unit's full load efficiency, EER, was below the required EER by the TRM. The EM&V team also found that the capacity of the installed system was higher than the capacity in the tracking data used to calculate ex-ante savings. The EM&V team adjusted accordingly, resulting in a decrease in demand savings and an increase in energy savings. Overall, the adjustments resulted in project-level realization rates of zero percent and 120.1 percent for demand and energy savings, respectively.

Documentation Score

The EM&V team was able to verify key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects that had desk reviews. Project documentation included customer agreement, photos, specification sheets, certifications, and field notes. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

3.4.2 Hard-to-Reach 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%	656	656	100.0%	0.4%	918,309	918,309	100.0%	Good

Completed desk reviews*	Completed On-site M&V
3	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 PY2021 Hard-to-Reach SOP evaluation efforts focused on desk reviews and on-site M&V. The number of sampled and completed desk reviews and site visits for this program are listed above.

Overall, the EM&V team assessed ex-ante claimed energy and demand savings across the following two activities:

- For a sample of projects, desk reviews were completed to check that measure data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated in accordance with the TRM.

- On-site M&V was completed for a sample of projects to verify that measures remained installed and matched project documentation.

The EM&V team did not have any adjustments from the desk reviews resulting in 100 percent realization rates.

Documentation Score

The EM&V team was able to verify key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects that had desk reviews. Project documentation included customer agreement, photos, and field notes. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

3.5 DETAILED FINDINGS—LOW-INCOME

3.5.1 Targeted Low-Income Market Transformation Program (Agencies in Action)

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%	4,765	4,765	100.0%	3.2%	7,626,224	7,626,224	100.0%	Fair

Completed desk reviews*	Completed on-site M&V
3	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 PY2021 Targeted Low-Income MTP evaluation efforts focused on desk reviews and on-site M&V. The number of sampled and completed desk reviews and site visits for this program are listed above.

Overall, the EM&V team assessed ex-ante claimed energy and demand savings across the following two activities:

- For a sample of projects, desk reviews were completed to ensure that data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated per the TRM.
- On-site M&V was completed for a sample of projects to verify that measures remained installed and matched project documentation.

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

Participant ID 1484615: The project included the installation of a new central heat pump system. During the desk review, the EM&V team found that the tracked ex-ante heating efficiency, HSPF, and capacity of the installed unit did not match the HSPF and capacity found in the documentation from the AHRI certificate. The EM&V team adjusted accordingly, resulting in a decrease in energy savings. Overall, the adjustments resulted in project-level realization rates of 100 percent and 79.4 percent for demand and energy savings, respectively.

Participant ID 1483464: The project included the installation of a new central heat pump system. During the desk review, the EM&V team found that the ex-ante early retirement calculation methodology slightly differed from the EM&V team's ex-post early retirement calculation methodology. The EM&V team sums the heating and cooling savings first before calculating weighted first-year savings, while the ex-ante savings were calculated using cooling savings only then adding heating savings to the weighted cooling savings. Weighted first-year savings should include both heating and cooling savings, and the EM&V team adjusted accordingly, resulting in a slight decrease in energy savings. Overall, the adjustments resulted in project-level realization rates of 100 percent and 99.2 percent for demand and energy savings, respectively.

Participant ID 1484316: The project included the installation of a new central heat pump system. During the desk review, the EM&V team found that the ex-ante early retirement calculation methodology slightly differed from the EM&V team's ex-post early retirement calculation methodology. The EM&V team sums the heating and cooling savings first before calculating weighted first-year savings, while the ex-ante savings were calculated using cooling savings only then adding heating savings to the weighted cooling savings. Weighted first-year savings should include both heating and cooling savings, and the EM&V team adjusted accordingly, resulting in a slight decrease in energy savings. Overall, the adjustments resulted in project-level realization rates of 100 percent and 99.2 percent for demand and energy savings, respectively.

Documentation Score

The EM&V team was able to verify some key inputs and assumptions, including the project scope, baselines, and equipment specifications for some sampled projects that had desk reviews. The EM&V team could not easily match the tracking data to one project's documentation. Project documentation included customer agreement, photos, and field notes. Documentation also included low-income certification. However, the TRM requires additional documentation to claim electric resistance heating, which was not included in the documentation. The absence of electric resistance documentation could result in savings adjustments in the future. Overall, the EM&V team was satisfied with the provided project documentation and assigned a fair program documentation score.

3.6 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

3.6.1 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
61.8%	130,971	130,973	100.0%	0.3%	785,823	785,823	100.0%	Good

Completed desk reviews*
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 CenterPoint Commercial Load Management SOP by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments. Load management events in PY2021 occurred on the following dates and times:

- June 16, 2021, from 2:00 p.m. to 5:00 p.m. (scheduled); and
- July 29, 2021, from 2:00 p.m. to 5:00 p.m. (scheduled).

The EM&V team received interval meter data and a spreadsheet summarizing the event-level savings for the 30 sponsors across 303 sites. Twenty-two sites did not participate in the first event, and 14 sites did not participate in the second event. Three sites did not have any load data associated with them as they did not participate in any event. All sponsors had at least one site that curtailed during each 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 CenterPoint provided for all sites. The kilowatt savings for each participating site corresponded to the average of energy reduced across both events. If a site participated in only one event, the kilowatt savings corresponded to the energy reduced during that event. The kilowatt-hour savings for each participating site and event were calculated by multiplying the kilowatt reductions by the total number of event hours. Program-level savings were calculated by adding all site-level savings.

The table above shows both the EM&V team (evaluated) and CenterPoint's (claimed) calculated kilowatt and kilowatt-hour savings. No adjustments were made to the program savings; however, a negligible difference in kilowatt and kilowatt-hour was a result of different rounding practices during calculations. Evaluated savings for the CenterPoint Large Commercial Load Management SOP are 130,973 kW and 785,825 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

3.6.2 Residential Load Management Standard Offer 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
11.4%	24,067	24,065	100.0%	0.0%	144,115	144,111	100.0%	Good

Completed desk reviews*
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 CenterPoint Residential Load Management SOP by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments. Demand response events in PY2021 occurred on the following dates and times:

- June 16, 2021, from 2:00 p.m. to 5:00 p.m. (scheduled); and
- July 29, 2021, from 2:00 p.m. to 5:00 p.m. (scheduled).

The EM&V team received the interval meter data and spreadsheets detailing the CenterPoint calculated baseline load, event load, and savings results for each service provider and meter. After a follow-up, CenterPoint provided documentation for meters with no meter data available during the event but were confirmed as having participated by the service provider and meters with partial meter data for the baseline days. These meters totaled 0.02 percent of the program population.

After the EM&V team applied the High 3 of 5 baseline calculation method, it was found that the evaluated kilowatt savings matched the kilowatt savings CenterPoint provided for most participating meters. Differences were a result of calculating the kilowatt savings for meters with partial or no data during the event of baseline days. The EM&V team included those meters for each service provider by applying the average savings (per the TRM, savings may still be calculated for less than two percent of meters that fail to record data sufficient to apply the High 3 of 5 calculation method). However, CenterPoint zeroed out the load for the days with partial or no meter data. The kilowatt savings for each participating meter corresponded to the average of energy reduced across both events. If a meter participated in only one event, the kilowatt savings corresponded to the energy reduced during that event.

The kilowatt-hour savings for each participating meter were calculated by multiplying the kilowatt reductions for each event by the total number of event hours. Program-level savings were calculated by adding all meter-level savings.

The table above shows both the EM&V team (evaluated) and CenterPoint's (claimed) calculated kilowatt and kilowatt-hour savings. No adjustments were made to the program savings as the difference was negligible. Evaluated savings for the CenterPoint Residential Load Management SOP are 24,065 kW and 144,111 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

3.7 SUMMARY OF LOW EVALUATION PRIORITY PROGRAMS

Table 11 summarizes claimed savings for CenterPoint's low evaluation priority programs in PY2021, including the programs' overall contribution to portfolio savings. *Low-priority programs' claimed savings were verified against the final PY2021 tracking data provided to the EM&V team for the EM&V database.*

Table 11. PY2021 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)
REP MTP (Commercial CoolSaver)	1.7%	3,556	3,556	100.0%	2.0%	4,725,671	4,725,671	100.0%
Commercial High Efficiency Foodservice MTP (Pilot)	0.1%	117	117	100.0%	0.3%	813,510	813,510	100.0%
Advanced Lighting Residential MTP	3.0%	6,448	6,448	100.0%	15.3%	35,955,005	35,955,005	100.0%
Smart Thermostat Program	0.0%	0	0	100.0%	1.9%	4,571,320	4,571,320	100.0%
REP MTP (Residential CoolSaver and Efficiency Connection)	0.8%	1,677	1,677	100.0%	2.7%	6,387,410	6,387,410	100.0%
Midstream MTP (HVAC and Pool Pump Distributor)	1.6%	3,485	3,485	100.0%	5.7%	13,329,650	13,329,650	100.0%
CenterPoint Energy High Efficiency Home MTP	6.4%	13,598	13,598	100.0%	15.7%	36,818,260	36,818,260	100.0%
Multi-Family MTP Market Rate	0.8%	1,775	1,775	100.0%	2.9%	6,924,488	6,924,488	100.0%
Multi-Family MTP Hard-to-Reach	0.0%	71	71	100.0%	0.2%	523,668	523,668	100.0%

4.0 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 priorities for which claimed savings were verified through the evaluation, measurement, and verification (EM&V) database is included.

4.1 KEY FINDINGS

4.1.1 Evaluated Savings

El Paso Electric's evaluated savings for program year (PY) 2021 were 27,325 in demand (kilowatt, kW) and 27,951,497 in energy (kilowatt-hour, kWh) savings. The overall kilowatt and kilowatt-hour 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 (see Table 15), supporting healthy realization rates.

Table 12 shows the claimed and evaluated demand savings for El Paso Electric's portfolio and broad customer sector and program categories.

Table 12. El Paso Electric PY2021 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%	27,325	27,325	100.0%	N/A
Commercial	13.7%	3,753	3,753	100.0%	N/A
Residential	9.7%	2,655	2,655	100.0%	N/A
Load management*	74.6%	20,388	20,388	100.0%	N/A
Pilot	1.9%	529	529	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 13 shows the claimed and evaluated energy savings for El Paso Electric's portfolio and broad customer sector and program categories for PY2021.

Table 13. El Paso Electric PY2021 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%	27,951,497	27,951,497	100.0%	N/A
Commercial	63.4%	17,717,514	17,717,514	100.0%	N/A
Residential	19.3%	5,384,206	5,384,206	100.0%	N/A
Load management*	9.5%	2,645,103	2,645,103	100.0%	N/A
Pilot	7.9%	2,204,674	2,204,674	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 qualitative rating of good, fair, and limited associated with the level of program documentation received from the utility. El Paso Electric received *good* documentation scores for all evaluated programs, except the Small Commercial Solutions Market Transformation Program (MTP) and the Residential Load Management Program, which received a *fair* documentation score.

4.1.2 Cost-Effectiveness Results

El Paso Electric's overall portfolio had a cost-effectiveness score of 3.9.

The more cost-effective programs were the Large C&I Solutions MTP and the Marketplace Pilot MTP (residential and commercial); the less cost-effective programs were the Residential Load Management MTP and Commercial Load Management SOP. All of El Paso Electric's programs were cost-effective in 2021.

The lifetime cost of evaluated savings was \$0.017 per kWh and \$13.97 per kW.

Table 14. El Paso Electric Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total portfolio	3.85	3.85	3.38
Commercial	5.73	5.73	5.11
Small Commercial Solutions MTP	4.63	4.63	4.40
Large C&I Solutions MTP	7.39	7.39	6.48
Texas SCORE MTP	3.48	3.48	3.08
Residential	2.68	2.68	2.48

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Residential Solutions MTP	3.79	3.79	3.42
LivingWise® MTP	1.94	1.94	1.55
Texas Appliance Recycling MTP	1.79	1.79	1.79
Hard-to-Reach Solutions MTP	2.49	2.49	2.49
Load management	1.21	1.21	1.21
Residential Load Management MTP	1.06	1.06	1.06
Commercial Load Management SOP	1.40	1.40	1.40
Pilot	9.83	9.83	4.92
Residential Marketplace Pilot MTP	9.08	9.08	4.54
Commercial Marketplace Pilot MTP	21.99	21.99	10.99

4.2 EVALUATED SAVINGS DIFFERENCES

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 15 summarizes savings differences identified by the EM&V team, which El Paso Electric also used to adjust their claimed savings. The EM&V team requests that utilities make adjustments to projects when evaluated, and claimed savings differ by more than five percent. El Paso Electric adjusted claimed savings for all projects with any differences found by the EM&V team and will include these adjustments in their May 1 filing.

Table 15. Evaluated and Claimed Savings Adjustments by Program

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Large C&I Solutions MTP	1.80	3,830.00
Residential Load Management MTP	-704.10	-7,047.00
Small Commercial Solutions MTP	-0.50	26,265.00
Texas SCORE MTP	1.10	7,442.00
Total	-701.70	30,490.00

4.3 DETAILED FINDINGS—COMMERCIAL

4.3.1 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
7.5%	2,043	2,043	100.0%	42.8%	11,952,274	11,952,274	100.0%	Good

Completed desk reviews*	On-site M&V visit
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 PY2021 Large C&I Solutions MTP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

The EM&V team adjusted the claimed savings for three projects. Two projects had less than five percent adjustments compared to the originally claimed savings, and one was larger than five percent. El Paso Electric 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 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1475262: The energy efficiency project included interior and exterior LED lighting retrofits and HVAC upgrades at a commercial grocery store. During the desk review, the EM&V team made adjustments to the wattages of several lights to match the DesignLights Consortium (DLC) Qualified Products List (QPL). These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 103 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 102 percent.

Participant ID 1477571: The energy efficiency project included interior LED lighting retrofits at a retail store. During the desk review and on-site M&V visit, the EM&V adjusted the quantity of one light. The adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 101 percent. The adjustment also increased energy (kilowatt-hour) savings and resulted in a realization rate of 101 percent.

Participant ID 1485286: The energy efficiency project included HVAC upgrades at a department store. During the desk review and on-site M&V visit, the EM&V adjusted the savings to match the amount claimed on the post-inspection calculator, which was different than the claimed energy savings. The adjustments decreased energy (kilowatt-hour) savings and resulted in a realization rate of 87 percent. There was no adjustment to the peak demand, and the 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; Air Conditioning, Heating, and Refrigeration Institute (AHRI) certifications) for the six projects that had desk reviews because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications or AHRI certifications, pre-inspection 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*.

4.3.2 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
3.6%	982	982	100.0%	10.0%	2,810,405	2,810,405	100.0%	Good

Completed desk reviews*	On-site M&V visit
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 PY2021 Texas SCORE MTP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

The EM&V team adjusted the claimed savings for two projects. Both projects had less than five percent adjustments compared to the originally claimed savings. El Paso Electric 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 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1477669: The energy efficiency project included HVAC tune-ups for a school district. During the desk review, the EM&V adjusted the cooling capacity to the nominal capacity to the capacity based on AHRI conditions. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 101 percent. This adjustment also increased energy (kilowatt-hour) savings and resulted in a realization rate of 101 percent.

Participant ID 1478082: The energy efficiency project included interior LED lighting retrofits at a university administrative building. During the desk review and on-site M&V visit, the EM&V team made adjustments to the wattages of several lights to match the DLC QPL. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 103 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 102 percent.

Documentation Score

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

4.3.3 Small Commercial Solutions Market Transformation Program (MTP) (Medium Evaluation Priority)

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
2.7%	728	728	100.0%	10.6%	2,954,835	2,954,835	100.0%	Fair

Completed desk reviews*	On-site M&V visit
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 PY2021 Small Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

The EM&V team adjusted the claimed savings for all eight projects. Two projects had adjustments of greater than five percent compared to the originally claimed savings, and the remaining six had adjustments of less than five percent. El Paso Electric accepted the evaluated results and matched the claimed savings for the projects with significant adjustments; therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1473918: The energy efficiency project included interior LED lighting retrofits at a religious facility. During the desk review, the EM&V team adjusted the wattage of one light to match the DLC QPL. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 101 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 102 percent.

Participant ID 1474710: The energy efficiency project included interior LED lighting retrofits at a strip mall. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of a few lights to match the DLC and ENERGY STAR® QPLs. These adjustments increased energy (kilowatt-hour) savings and resulted in a realization rate of 101 percent.

Participant ID 1484768: The energy efficiency project included exterior LED lighting retrofits at a commercial parking lot. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of one light to match the DLC QPL. This adjustment increased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. The adjustments also increased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1484769: The energy efficiency project included exterior LED lighting retrofits at an office. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of one light to match the DLC QPL. This adjustment increased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. The adjustments also increased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1485250: The energy efficiency project included interior LED lighting retrofits at a warehouse. During the desk review, the EM&V team corrected a data entry error in the tracking system. This adjustment also increased energy (kilowatt-hour) savings and resulted in a realization rate of 504 percent. The peak demand did not change, and the realization rate is 100 percent.

Participant ID 1499215: The energy efficiency project included interior and exterior LED lighting retrofits at an outpatient clinic. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of multiple lights to match the DLC QPL. One light was also disqualified because the model number was not located in the DLC QPL, and the invoice was not itemized to determine if this was an abbreviated listing of the model number. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 97 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 97 percent.

Participant ID 1499256: The energy efficiency project included the installation of air infiltration measures at a multifamily complex office. During the desk review, the EM&V team disqualified the door sweep portion of the weatherization because it did not meet the high-efficiency condition specified by the TRM. This adjustment decreased peak demand (kilowatt) savings and resulted in a realization rate of 73 percent. This adjustment also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 73 percent.

Participant ID 1499554: The energy efficiency project included the installation of LED lighting at a new construction commercial warehouse/distribution center. During the desk review, the EM&V team updated lighting quantities to match the post-inspection form. In addition, the EM&V team removed one light because it was decorative lighting that does not count against new construction lighting density. This adjustment decreased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. This adjustment also decreased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Documentation Score

The EM&V team partially verified key inputs and assumptions for the eight projects that had desk reviews. Project documentation included final calculation files, inspection photos, inspection forms, specification sheets, invoices, and QPL certifications. However, several projects had missing documentation, including post-inspection notes, calculator files, and invoices that were not itemized, making it difficult to verify quantities, specific parameters (e.g., air conditioning type), or proof of purchase. 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*.

4.4 DETAILED FINDINGS—RESIDENTIAL

4.4.1 Residential 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
4.1%	1,115	1,115	100.0%	6.9%	1,932,842	1,932,842	100.0%	Good

Completed desk reviews*
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 PY2021 Residential MTP evaluation efforts focused on desk reviews. The number of sampled and completed desk reviews for this program is listed above. Four desk reviews were completed to check that measure data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated in accordance with the TRM.

The EM&V team did not have any adjustments from the desk reviews resulting in 100 percent realization rates.

Documentation Score

The EM&V team verified most key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects, with desk reviews. Project documentation included customer agreements, invoices, and certifications. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

4.4.2 Hard-to-Reach 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
4.1%	1,117	1,117	100.0%	5.6%	1,562,495	1,562,495	100.0%	Good

Completed desk reviews*	Completed 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 PY2021 Hard-to-Reach 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 have any adjustments from the desk reviews or the on-site M&V resulting in 100 percent realization rates.

Overall, the EM&V team assessed ex-ante claimed energy and demand savings across the following two activities:

- For a sample of projects, desk reviews were completed to ensure that data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated per the TRM.
- On-site M&V was completed for a sample of projects to verify that measures remained installed and matched project documentation.

Documentation Score

The EM&V team verified most key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects with desk reviews. Project documentation included customer agreements, invoices, income eligibility forms, and certifications. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

4.5 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

4.5.1 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
45.2%	12,344	12,344	100.0%	0.0%	12,344	12,344	100.0%	Good

Completed desk reviews*

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 Commercial Load Management SOP by applying the technical reference manual (TRM) calculation methodology to interval meter data. The meter data was supplied in 30-minute increments. In PY2021, only one load management event occurred on June 11, 2021, from 4:00 p.m. to 5:00 p.m. (scheduled).

The EM&V team received the interval meter data and a spreadsheet that summarized the event-level savings for the nine sponsors across 26 sites. All sites had load data associated with them for the event.

After the EM&V team applied the High 5 of 10 baseline calculation method, it was found that the evaluated savings matched El Paso Electric's savings for all sites. The kilowatt savings for each participating site corresponded to the energy reduced during the scheduled event. The kilowatt-hour savings for each participating site were calculated by multiplying the kilowatt reductions by the total number of event hours. Program-level savings were calculated by adding all site-level savings.

The table above shows both the EM&V team (evaluated) and El Paso Electric's (claimed) calculated kilowatt and kilowatt-hour savings. No adjustment was made to the kilowatt and kilowatt-hour savings. For the kilowatt savings, the EM&V team matched the rounding practice utilized by El Paso Electric since it is also used for invoicing. For the kilowatt-hour savings, El Paso Electric and the EM&V team followed the practice recommended in the TRM. Evaluated savings for the El Paso Electric Load Management SOP are 12,344 kW and kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

4.5.2 Residential Load Management 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
29.4%	8,044	8,044	100.0%	9.4%	2,632,759	2,632,759	100.0%	Fair

Completed desk reviews*

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 Residential Load Management MTP by applying the deemed savings value from the TRM. Load management events in PY2021 occurred on the following dates and times:

- June 11, 2021, from 4:00 p.m. to 5:00 p.m. (unscheduled),
- August 10, 2021, from 3:00 p.m. to 5:00 p.m. (unscheduled),
- August 23, 2021, from 3:00 p.m. to 5:00 p.m. (unscheduled),
- August 25, 2021, from 3:00 p.m. to 5:00 p.m. (unscheduled), and
- September 14, 2021, from 3:30 p.m. to 5:30 p.m. (unscheduled).

The EM&V team received a list of participants in the program for each device type and event, the PY2021 list of devices purchased through the Marketplace with incentives received, and a savings summary report. After a first review of the files, the EM&V team met with El Paso Electric to understand the approach used to determine the number of participating devices for each device type and event. The kilowatt savings for each event was calculated by multiplying the deemed savings value from the TRM by the number of participating devices. The kilowatt-hour savings for each event were calculated by multiplying the kilowatt reductions by the total number of event hours. Program-level savings were calculated by adding all event-level savings. After a second review of the files, the EM&V team adjusted the number of participating devices, decreasing the kilowatt and kilowatt-hour savings.

In addition to savings from the load management events, El Paso Electric claimed savings from new thermostat devices purchased through their Marketplace website that enrolled in the load management program at the time of the purchase. Only thermostat devices that enrolled in the program before September 30 were included in the savings calculation. No adjustment was made to this portion of the program savings.

The table above shows both the EM&V team (evaluated) and El Paso Electric's (claimed) calculated kilowatt and kilowatt-hour savings. Evaluated savings for the El Paso Electric Residential Load Management program are 8,044 kW and 2,632,759 kWh, with realization rates of 92.0 percent kilowatt and 99.7 percent kilowatt-hour. El Paso Electric accepted the evaluated results and matched the claimed savings to those of the evaluated savings; therefore, the final program realization rate for both kilowatt and kilowatt-hour is 100 percent. Overall, the EM&V team assigned a program documentation score of *fair*. The EM&V team understands that the program is still in its early stages and has undergone an implementer change in 2020. The

EM&V team will continue working with the new program implementer to improve the documentation of program participants (e.g., adding descriptions of the different fields in the participants' lists and providing the approach or equations used to determine the number of participating devices).

4.6 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 16 summarizes claimed savings for El Paso's programs in PY2021 that only received a tracking system verification of program impacts. The programs' claimed savings were verified against the final PY2021 tracking data provided to the EM&V team for the EM&V database.

Table 16. PY2021 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)
Texas Appliance Recycling MTP	0.3%	90	90	100.0%	2.7%	729,252	729,252	100.0%
Residential Marketplace Pilot MTP	1.7%	463	463	100.0%	7.0%	1,883,892	1,883,892	100.0%
Commercial Marketplace Pilot MTP	0.2%	65	65	100.0%	1.2%	320,782	320,782	100.0%
LivingWise [®] MTP	1.2%	333	333	100.0%	4.1%	1,159,617	1,159,617	100.0%

5.0 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 priorities for which claimed savings were verified through the evaluation, measurement, and verification (EM&V) database is included.

5.1 KEY FINDINGS

5.1.1 Evaluated Savings

Entergy's evaluated savings for program year (PY) 2021 were 20,607 in demand (kilowatt, kW) and 57,477,359 in energy (kilowatt-hour, kWh) savings. The overall kilowatt and kilowatt-hour portfolio realization rates are approximately 100 percent. Entergy was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (see Table 20), supporting healthy realization rates.

Table 17 shows the claimed and evaluated demand savings for Entergy's portfolio and broad customer sector and program categories. Residential and Load management results are based on census reviews, and therefore precision calculations are not applicable (N/A).

Table 17. Entergy PY2021 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%	20,606	20,607	100.0%	N/A
Commercial	32.2%	6,644	6,644	100.0%	N/A
Residential	33.7%	6,947	6,947	100.0%	N/A
Load management*	34.1%	7,015	7,016	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 18 shows the claimed and evaluated energy savings for Entergy's portfolio and broad customer sector and program categories for PY2021.

Table 18. Entergy PY2021 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%	57,477,358	57,477,359	100.0%	N/A
Commercial	63.7%	36,629,435	36,629,435	100.0%	N/A
Residential	36.3%	20,840,908	20,840,908	100.0%	N/A
Load management*	0.0%	7,015	7,016	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 qualitative rating of good, fair, and limited associated with the level of program documentation received from the utility. Entergy received *good* documentation scores for all evaluated programs.

5.1.2 Cost-Effectiveness Results

Entergy’s overall portfolio had a cost-effectiveness score of 4.4.

The more cost-effective programs were the Commercial Solutions MTP and the Residential Solutions MTP; the less cost-effective programs were the Load Management SOP and the Hard-To-Reach SOP. All of Entergy’s programs were cost-effective in 2021.

The lifetime cost of evaluated savings was \$0.015 per kWh and \$10.01 per kW.

Table 19. Entergy Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total portfolio	4.40	4.40	3.96
Commercial	6.20	6.20	5.44
Commercial Solutions MTP	6.20	6.20	5.44
Residential	3.41	3.41	3.15
Residential SOP	2.11	2.11	1.90
Residential Solutions MTP	7.78	7.78	7.04
Hard-to-Reach SOP	2.00	2.00	2.00
Load management	1.47	1.47	1.47
Load Management SOP	1.47	1.47	1.47

5.2 EVALUATED SAVINGS DIFFERENCES

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 20 summarizes evaluated savings differences identified by the EM&V team. The EM&V team requests that utilities make adjustments to projects when evaluated, and claimed savings differ by more than five percent. Entergy made adjustments to projects to address all evaluated savings differences prior to their April 1 EEPR.

Table 20. Evaluated Savings Differences by Program

Program	Evaluated demand savings differences (kW)	Evaluated energy savings differences (kWh)
Commercial Solutions MTP	5.96	58,348
Total	5.96	58,348

5.3 DETAILED FINDINGS—COMMERCIAL

5.3.1 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
32.2%	6,644	6,644	100.0%	63.7%	36,629,435	36,629,435	100.0%	Good

Completed desk reviews*	On-site M&V visit
16	5

*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 PY2021 Commercial Solutions MTP evaluation efforts focused on desk reviews with on-site M&V visits completed on a subset of the sample. The sample of completed desk reviews and on-site M&V for this program are listed above.

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

Participant ID 1548181: The energy efficiency project was a retrofit of an elementary school HVAC system with 28 new water-sourced heat pumps (WSHP), Delta DDC controllers, and the replacement of the WSHP water loop cooling tower. During the desk review, the

EM&V team adjusted the custom calculation methodology. Demand savings showed a difference because the methodology claimed monthly estimates of demand reduction as opposed to hourly estimates. The EM&V desk review was adjusted to use the hourly results based on the consumption analysis. In addition, the EM&V desk review adjusted the independent variables used in the consumption analysis to better reflect the hourly savings. Making the savings methodology adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 97 percent. The project had zero annual energy savings (kilowatt-hour) savings.

Participant ID 1548182: The energy efficiency project was the installation of a new building automation system controls on the existing HVAC system in an army reserve operation building. During the desk review, the EM&V team adjusted the calculation methodology. Demand savings showed a difference because the methodology claimed monthly estimates of demand reduction as opposed to hourly estimates. The EM&V desk review was adjusted to use the hourly results based on the consumption analysis. In addition, the EM&V desk review adjusted the independent variables used in the consumption analysis to better reflect the hourly savings. Making the savings methodology adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 14 percent. The annual energy savings (kilowatt-hour) realization rate is 100 percent.

Participant ID 1548213: The energy efficiency included interior lighting retrofits at a beverage packaging manufacturing facility. During the desk review, the EM&V team adjusted the control device for three line items from “Occupancy Sensor” to “Multiple Control Measures” because the control devices described in the specification sheet included both occupancy sensors and daylight harvesting. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 118 percent. The adjustment increased energy (kilowatt-hour) savings and resulted in a realization rate of 119 percent.

Participant ID 1548214: The energy efficiency project was the replacement of five 100-hp pumps with six more efficient 50-hp vacuum pumps controlled by variable frequency drives. During the desk review, the EM&V team adjusted the calculation methodology to use average kW readings instead of maximum kW readings. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 116 percent. The adjustment decreased energy (kilowatt-hour) savings and resulted in a realization rate of 99 percent.

Participant ID 1548218: The energy efficiency included interior and exterior lighting retrofits at a dialysis clinic. During the desk review, the EM&V team disqualified one light because its model number could not be found in the ENERGY STAR® database. This adjustment decreased peak demand (kilowatt) savings and resulted in a realization rate of 83 percent. The adjustment decreased energy (kilowatt-hour) savings and resulted in a realization rate of 89 percent.

Participant ID 1548242: The energy efficiency included interior and exterior lighting retrofits at an auto service shop and dealership. During the desk review, the EM&V team changed the predominant building type from *non-24-hour stand-alone retail* to *service: excluding food* because the dealership is closed on Sundays and more of the building area corresponds with the garage/shop than the office/showroom. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 101 percent. The adjustment decreased energy (kilowatt-hour) savings and resulted and resulted in a realization rate of 99 percent.

Participant ID 1548333: The energy efficiency project was the replacement of evaporator fan motors for refrigerated display cases with more efficient ECM fan motors, respective evaporator fan controls, and electronic defrost controls. During the desk review and on-site M&V visit, the EM&V team adjusted the quantity of medium-temperature fan motors installed from five to four based on the quantity found to be installed on-site. In addition, the EM&V team adjusted the refrigeration temperature for the electronic defrost controls from all *low temperatures* to a combination of *low temperature* and *medium temperature*. This adjustment decreased peak demand (kilowatt) savings and resulted in a realization rate of 97 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 98 percent.

Participant ID 1548381: The energy efficiency project involved the installation of LED light fixtures on the interior and exterior lighting of a new construction junior high school. During the desk review and on-site M&V visit, the EM&V team adjusted the air conditioning type for one line item from *air-conditioned* to *none*, based on on-site findings. In addition, the calculations were updated to the PY2021 from the calculator used when the project started. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 102 percent. The adjustment also increased energy (kilowatt-hour) savings and resulted in a realization rate of 102 percent.

Participant ID 1548391: The energy efficiency project included interior and exterior lighting retrofits at a warehouse. Based on the inspection photos, the EM&V team adjusted the air conditioning type for three line items from air-conditioned to none during the desk review. In addition, one light (ZY-T8-40W-2400-B-I-NT-4000K) is adjusted from 40W to 39W to match the DLC QPL. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 95 percent. The adjustment also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 98 percent.

Participant ID 1548406: 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 quantity of ETH-HBE-2-162 light fixtures from 231 to 329 to match the invoice. The claimed installed quantity could not be verified during the on-site visit. This adjustment decreased peak demand (kilowatt) savings and resulted in a realization rate of 94 percent. The adjustment also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 95 percent.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity; equipment capacity; QPL qualifications; Air Conditioning, Heating, and Refrigeration Institute (AHRI) certifications) for sixteen projects that had desk reviews because sufficient documentation was provided for the sites. Project documentation included M&V Plans, invoices, QPL qualifications or AHRI certifications, equipment specification sheets, pre-inspection 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*.

5.4 DETAILED FINDINGS—RESIDENTIAL

5.4.1 Residential 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%	1,602	1,602	100.0%	12.9%	7,298,167	7,298,167	100.0%	Good

Completed desk reviews*
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 PY2021 Residential SOP evaluation efforts focused on desk reviews. The number of sampled and completed desk reviews for this program is listed above. Four desk reviews were completed to check that measure data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated in accordance with the TRM.

The EM&V team did not have any adjustments from the desk reviews resulting in 100 percent realization rates.

Documentation Score

For all sampled projects, the EM&V team was able to verify key inputs and assumptions (e.g., pre- and post- condition results) for ceiling insulation and duct efficiency. There was limited documentation for direct installs such as LEDs and low-flow showerheads. Because sufficient documentation was provided for most of the measures across all the reviewed projects, the EM&V team assigned a program documentation score of *good*.

5.4.2 Hard-to-Reach 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
8.5%	1,745	1,745	100.0%	8.5%	4,781,393	4,781,393	100.0%	Good

Completed desk reviews*	Completed on-site M&V
4	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 PY2021 Hard-to-Reach 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 did not have any adjustments from the desk reviews or the on-site M&V resulting in 100 percent realization rates.

Overall, the EM&V team assessed ex-ante claimed energy and demand savings across the following two activities:

- For a sample of projects, desk reviews were completed to ensure that data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated per the TRM.
- On-site M&V was completed for a sample of projects to verify that measures remained installed and matched project documentation.

Documentation Score

For all sampled projects, the EM&V team was able to verify key inputs and assumptions (e.g., pre- and post- condition results) for ceiling insulation, air infiltration, and duct efficiency. There was limited documentation for direct installs such as LEDs. Because sufficient documentation was provided for most of the measures across all the reviewed projects, the EM&V team assigned a program documentation score of *good*.

5.5 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

5.5.1 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
34.1%	7,015	7,016	100.0%	0.0%	7,015	7,016	100.0%	Good

Completed desk reviews*

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 SOP by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments. Load management events in PY2021 occurred on the following dates and times:

- June 24, 2021, from 2:00 p.m. to 3:00 p.m. (unscheduled),
- June 21, 2021, from 2:00 p.m. to 3:00 p.m. (unscheduled),
- June 23, 2021, from 3:00 p.m. to 4:00 p.m. (unscheduled),
- June 25, 2021, from 1:00 p.m. to 2:00 p.m. (unscheduled),
- June 24, 2021, from 1:00 p.m. to 2:00 p.m. (unscheduled),
- June 29, 2021, from 1:00 p.m. to 2:00 p.m. (unscheduled),
- June 23, 2021, from 1:30 p.m. to 2:30 p.m. (unscheduled), and
- June 22, 2021, from 2:00 p.m. to 3:00 p.m. (unscheduled).

There were no scheduled events in PY2021. The EM&V team received interval meter data and a spreadsheet that summarized the event-level savings for the eight sponsors across 53 sites. Four sites did not participate in any of the unscheduled events. Each of the remaining sites participated in one of the unscheduled events.

After the EM&V team applied the *High 5 of 10* baseline calculation method, it was found that the evaluated savings matched the savings Entergy provided for all sites. The kilowatt savings for each participating site corresponded to the kilowatt reductions that occurred at the unscheduled event (no averaging was necessary because each participating site participated in only one event). The kilowatt-hour savings for each participating site were calculated by multiplying the kilowatt reductions by the total number of event hours. Program-level savings were calculated by adding all site-level savings.

The table above shows both the EM&V team (evaluated) and Entergy's (claimed) calculated kilowatt and kilowatt-hour savings. No adjustments were made to the program savings; however, a negligible difference in kilowatt and kilowatt-hour was a result of different rounding practices during calculations. Evaluated savings for the Entergy Load Management SOP are 7,016 for kW and kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

5.6 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 16 summarizes claimed savings for CenterPoint's programs in PY2021 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2021 tracking data provided to the EM&V team for the EM&V database.

Table 21. PY2021 Claimed Savings (Tracking-System-Only Evaluated Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand	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	7.7%	3,600	3,600	100.0%	15.3%	8,761,348	8,761,348	100.0%

6.0 ONCOR ELECTRIC DELIVERY COMPANY, LLC IMPACT EVALUATION RESULTS

This section presents the evaluated savings and cost-effectiveness results for Oncor Electric Delivery Company, LLC (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 priorities for which claimed savings were verified through the evaluation, measurement, and verification (EM&V) database is included.

6.1 KEY FINDINGS

6.1.1 Evaluated Savings

Oncor's evaluated savings for program year (PY) 2021 were 235,415 in demand (kilowatt, kW) and 309,952,607 in energy (kilowatt-hour, kWh) savings. The overall kilowatt and kilowatt-hour 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 25), supporting healthy realization rates.

Table 22 shows the claimed and evaluated demand savings for Oncor's portfolio and broad customer sector and program categories. Residential and load management results are based on census reviews, and therefore precision calculations are not applicable (N/A).

Table 22. Oncor PY2021 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%	234,951	235,415	100.2%	N/A
Commercial	11.8%	27,793	27,796	100.0%	N/A
Residential	25.5%	59,947	59,947	100.0%	N/A
Low-income	1.4%	3,251	3,251	100.0%	N/A
Load management*	61.3%	143,918	144,380	100.3%	N/A
Pilot	0.0%	42	42	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 23 shows the claimed and evaluated energy savings for Oncor's portfolio and broad customer sector and program categories for PY2021.

Table 23. Oncor PY2020 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%	309,933,718	309,952,607	100.0%	N/A
Commercial	40.2%	124,580,566	124,598,069	100.0%	N/A
Residential	57.7%	178,807,061	178,807,036	100.0%	N/A
Low-income	1.9%	6,029,852	6,029,878	100.0%	N/A
Load management*	0.1%	431,755	433,140	100.3%	N/A
Pilot	0.0%	84,484	84,484	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 qualitative rating of good, fair, and limited associated with the level of program documentation received from the utility. Oncor received *good* documentation scores for all evaluated programs, except the Retro-Commissioning MTP, for which the EM&V team did not review the documentation to provide a documentation score due to minimal program participation. (See 4.3.3 Retro-Commissioning MTP for additional details.)

6.1.2 Cost-Effectiveness Results

Oncor's overall portfolio had a cost-effectiveness score of 3.9, or 4.2, excluding low-income programs.

The more cost-effective programs were the Retail Products MTP (residential and commercial) and the Commercial SOP; the less cost-effective programs were the Retro-commissioning MTP and the Commercial HVAC Distributor MTP (Pilot). All of Oncor's programs were cost-effective in 2021 except the pilot program.

The lifetime cost of evaluated savings was \$0.016 per kWh and \$12.98 per kW.

Table 24. Oncor Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total portfolio	3.90	3.90	3.07
Total portfolio excluding low-income programs	4.24	4.24	3.32

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Commercial	4.74	4.74	4.02
Commercial SOP	4.63	4.63	4.20
Solar PV SOP	2.31	2.31	2.33
Small Business Direct Install MTP	1.87	1.88	1.78
Retail Products MTP	45.78	45.78	22.89
Retro-Commissioning MTP	1.37	1.37	1.24
Residential	4.40	4.40	3.16
Home Energy Efficiency SOP	3.45	3.45	3.12
Solar PV SOP	2.30	2.30	2.20
Retail Products MTP	9.44	9.44	4.72
Residential New Home Construction MTP	2.52	2.52	1.26
Hard-to-Reach SOP	2.42	2.42	2.42
Low-income	1.90	1.90	1.90
Targeted Weatherization Low-Income SOP*	1.90	1.90	1.90
Load management	1.63	1.64	1.64
Residential Load Management SOP	1.35	1.35	1.35
Commercial Load Management SOP	1.78	1.78	1.78
Pilot	0.25	0.25	0.20
Commercial HVAC Distributor MTP Pilot	0.25	0.25	0.20

* The low-income program is evaluated using the savings-to-investment ratio (SIR).

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 25Table 15 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. There may be differences between evaluated and claimed savings that did not result in a recommended adjustment because the difference is less than five percent.

Table 25. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF⁸ Filing)

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial SOP	15.50	3,835.00
Small Business Direct Install MTP	-4.40	-18,337.00
Hard-to-Reach SOP	1.40	4,235.70
Targeted Weatherization Low-Income	0.00	707.60
Home Energy Efficiency SOP	-1.50	-1,687.30
Total	11.00	-11,246.00

6.3 DETAILED FINDINGS—COMMERCIAL

6.3.1 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
8.1%	19,002	19,004	100.0%	27.1%	84,006,948	84,022,069	100.0%	Good

Completed desk reviews*	On-site M&V visit
28	13

*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 PY2021 Commercial SOP evaluation efforts focused on desk reviews and on-site M&V visits. The sample of completed desk reviews and on-site M&V visits for this program is listed above.

The EM&V team adjusted the claimed savings for 18 projects. Eight had adjustments that were less than five percent. Ten projects had adjustments greater than five percent compared to the originally claimed savings. Oncor accepted the evaluated results and did not match the claimed kilowatt-hour and kilowatt savings for the projects with less than five percent adjustment. Including the on-adjusted values, the final program realization rate is nearly 100 percent. Further details of the EM&V findings are provided below.

⁸ Energy efficiency cost recovery factor.

Participant ID 1420403: The energy efficiency project included exterior LED lighting retrofits at a bank. During the desk review, the EM&V team adjusted the wattages for two installed fixtures to match the DesignLights Consortium (DLC) Qualified Products List (QPL). These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 109 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 108 percent.

Participant ID 1420467: The energy efficiency project included interior LED lighting retrofits at a commercial retail store. During the desk review, the EM&V team adjusted the building type from *food sales: non-24 hour supermarket or convenience store* to *mercantile: non-24 hour stand-alone retail*, based on the photos provided. In addition, the quantity of fixtures was adjusted by one based on the photos provided. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 116 percent. The adjustments decreased energy (kilowatt-hour) savings and resulted in a realization rate of 90 percent.

Participant ID 1420484: The energy efficiency project included interior and exterior LED lighting retrofits at a community college. During the desk review, the EM&V team adjusted several lighting wattages to match the DLC QPL. One light was adjusted from the exterior to interior inventory based on the photos provided. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 109 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 104 percent.

Participant ID 1420487: The energy efficiency project included interior LED lighting retrofits at a commercial retail store. During the desk review, the EM&V team adjusted the building type from *food sales: non-24 hour supermarket or convenience store* to *mercantile: non-24 hour stand-alone retail*, based on the photos provided. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 117 percent. The adjustments decreased energy (kilowatt-hour) savings and resulted in a realization rate of 90 percent.

Participant ID 1420572: The energy efficiency project included interior and exterior LED lighting retrofits at a parking garage. During the desk review, the EM&V team adjusted the baseline fixture codes of one light based on the pre-retrofit photos. The fixture quantities of one light in the baseline case and one light in the retrofit case were adjusted to ensure consistent tube counts with the number of retrofit tubes shown on the invoice. One lighting wattage was adjusted to match the DLC QPL. One light was adjusted from *non-qualified* to *qualified* because the DLC certification for the light was identified on the QPL. All of these adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 73 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 71 percent.

Participant ID 1420575: The energy efficiency project included the installation of two energy-efficient chillers and 12 heat pumps at a new construction visual and performing arts center. During the desk review, the EM&V team adjusted the heating capacity of one heat pump to match the capacity listed on the AHRI certification. This adjustment slightly decreased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. This adjustment also slightly increased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1420616: The energy efficiency project included interior and exterior LED retrofits at a car dealership. The EM&V team also applied a rounding error adjustment for one light. This adjustment slightly decreased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. This adjustment also slightly increased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1459670: The energy efficiency project included interior and exterior LED retrofits at a university building. During the desk review and on-site M&V visit, the EM&V team adjusted the quantity of a few lights based on on-site observations. There was also a slight rounding error between the ex-ante and ex-post calculators. This adjustment decreased peak demand (kilowatt) savings and resulted in a realization rate of 99 percent. This adjustment also decreased energy (kilowatt-hour) savings but resulted in a realization rate of 99 percent.

Participant ID 1459679: The energy efficiency project included interior and exterior LED retrofits at a library building on a school campus. During the desk review and on-site M&V visit, the EM&V team adjusted the quantity of a few lights based on on-site observations. There was also a slight rounding error between the ex-ante and ex-post calculators. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 107 percent. This adjustment also increased energy (kilowatt-hour) savings but resulted in a realization rate of 108 percent.

Participant ID 1459694: The energy efficiency project included interior and exterior LED retrofits at a food warehouse. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of several light fixtures to match the DLC QPL. The quantity of one light was adjusted based on photos. One light was adjusted from *non-qualified* to *qualified* because the DLC certifications were located on the QPL. One light is adjusted from an interior to exterior light based on the photos and site observations. There was also a slight rounding error between the ex-ante and ex-post calculators. These adjustments slightly decreased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. This adjustment increased energy (kilowatt-hour) savings and resulted in a realization rate of 101 percent.

Participant ID 1459698: The energy efficiency project included interior LED retrofits at an auto parts warehouse. During the desk review, the EM&V team adjusted the quantity of baseline fixtures in two building areas based on the post-inspection. This adjustment decreased peak demand (kilowatt) savings and resulted in a realization rate of 99 percent.

Participant ID 1459727: The energy efficiency project included interior and exterior LED retrofits at an automobile service center. During the desk review and on-site M&V visit, the EM&V team adjusted the air conditioning type of the shop areas based on on-site observations. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 111 percent. This adjustment increased energy (kilowatt-hour) savings and resulted in a realization rate of 107 percent.

Participant ID 1459737: The energy efficiency project included the installation of interior and exterior LED lighting at a new construction non-refrigerated warehouse building. During the desk review, the EM&V team adjusted the lighting wattage for a couple of lights to match the DLC QPL. In addition, the quantities and wattages of a few lights were adjusted to match the post-inspection findings. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 101 percent. These adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 101 percent.

Participant ID 1459757: The energy efficiency project included interior LED lighting retrofits at a retail store. During the desk review and on-site M&V visit, the EM&V team adjusted the building type assumption to match the *Mercantile: Non-24 Hour Stand-alone Retail* from the TRM. These adjustments decreased energy (kilowatt-hour) savings and resulted in a realization rate of 80 percent. The peak demand (kilowatt) savings remained at a 100 percent realization rate.

Participant ID 1486909: The energy efficiency project included the installation of interior and exterior LED lighting, with controls, at a new construction non-refrigerated warehouse building. During the desk review and on-site M&V visit, the EM&V team adjusted the air conditioning type from *none* to *refrigerated air* in the electrical room. One quantity adjustment was also made based on on-site observations. These adjustments slightly increased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. This adjustment also increased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1501262: The energy efficiency project included the installation of HVAC and food service equipment at a new construction full-service restaurant. During the desk review, the EM&V team adjusted the savings for the food service equipment based on the prescriptive method described by the TRM and the ENERGY STAR® certifications. The calculation methodology is unclear from the ex-ante savings calculation, so the reason for the deviation is unknown. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 123 percent. This adjustment also increased energy (kilowatt-hour) savings and resulted in a realization rate of 115 percent.

Participant ID 1501319: The energy efficiency project included the installation of LED lighting and controls and HVAC and refrigeration equipment at a new construction convenience store. During the desk review and on-site M&V visit, the EM&V team adjusted the volume of refrigerated space to be slightly smaller than originally claimed based on on-site observations. The wattage of one light was also adjusted to match the DLC QPL. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 101 percent. These adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 101 percent.

Participant ID 1501985: The energy efficiency project included interior LED lighting retrofits at an industrial warehouse. During the desk review, the EM&V team adjusted the air conditioning type of two areas from *none* to *low temperature refrigeration* and to *medium temperature refrigeration*, based on the pre-installation inspection notes. There were also slight rounding errors between the ex-ante and ex-post calculators for each line item. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 125 percent. These adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 125 percent.

Documentation Score

The EM&V team was primarily able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for the 28 projects that had desk reviews because sufficient documentation was provided for the sites. However, a few projects had missing documentation, including DLC certifications, savings calculations, invoices, furnace, and lighting nameplate photos, which made verifying air conditioning type, the quantity of lights, or energy and/or demand savings difficult. Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. Overall, however, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

6.3.2 Small Business Direct Install Market Transformation Program (MTP) (Medium Evaluation Priority)

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%	750	751	100.1%	1.1%	3,404,152	3,406,535	100.1%	Good

Completed desk reviews*	On-site M&V visit
10	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 PY2021 Small Business Direct Install MTP evaluation efforts focused on desk reviews and on-site M&V visits. The sample of completed desk reviews and on-site M&V visits for this program is listed above.

The EM&V team adjusted the claimed savings for seven of the projects. Four projects had adjustments of less than five percent compared to the originally claimed savings. Three projects had adjustments of 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 seven projects; therefore, the final program realization rate is 100 percent for kilowatt and kilowatt-hour. Further details of the EM&V findings are provided below.

Participant ID 1430360: The energy efficiency project included interior and exterior LED lighting retrofits of a non-refrigerated warehouse. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of one light to match the wattage on its ENERGY STAR certification. These adjustments slightly decreased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1430366: The energy efficiency project included the installation of electronically commutated motors on a walk-in cooler at a winery. During the desk review, the EM&V team adjusted the annual hours of operation from 8,723 to 8,273 to match the TRM operating hours assumption for a walk-in cooler. This adjustment decreased energy (kilowatt-hour) savings and resulted in a realization rate of 95 percent.

Participant ID 1430388: The energy efficiency project included interior and exterior LED retrofits at an elementary school. During the desk review and on-site M&V visit, the EM&V team adjusted the baseline fixture types to better match the pre-retrofit photos. The wattage for one light was also adjusted to match the DLC QPL. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 76 percent. These adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 77 percent.

Participant ID 1430398: The energy efficiency project included interior and exterior LED retrofits at a high school. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage for one light to match the DLC QPL. This adjustment slightly decreased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. These adjustments slightly increased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1430405: The energy efficiency project included interior and exterior LED retrofits at a commercial car dealership and a vehicle service shop. During the desk review, the EM&V team adjusted the wattage for a couple of lights to match the DLC QPL. This adjustment slightly increased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. These adjustments slightly increased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1430417: The energy efficiency project included interior LED retrofits at a church. During the desk review, the EM&V team adjusted the fixture code for a baseline light based on a pre-retrofit installation photo. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 104 percent. This adjustment also increased energy (kilowatt-hour) savings and resulted in a realization rate of 104 percent.

Participant ID 1532725: The energy efficiency project included interior LED retrofits at a retail facility. During the desk review and on-site M&V visit, the EM&V team found that HVAC interactive effects are not accounted for in the ex-ante calculation. The EM&V team adjusted the savings calculation to include the HVAC interactive effects factors. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 110 percent. This adjustment also increased energy (kilowatt-hour) savings and resulted in a realization rate of 109 percent.

Documentation Score

The EM&V team verified key inputs and assumptions (e.g., equipment quantity, QPL qualifications) for the ten projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation at these sites included invoices, QPL qualifications, pre-install and post-install inspection notes, project savings calculators, and photographic documentation of existing and new equipment. Complete documentation enhances the accuracy and transparency of project savings and ease of evaluation. Overall, the EM&V team assigned a program documentation score of *good*.

6.3.3 Retro-Commissioning Market Transformation Program (MTP) (Medium Evaluation Priority)

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
0.0%	0	0	00.0%	0.1%	330,162	330,162	100.0%	N/A

Completed desk reviews*
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.

Due to minimal program participation, the PY2021 Retro-Commissioning MTP evaluation efforts were allocated to other high and medium priority commercial programs.

The EM&V team did not adjust the claimed savings or review the documentation to provide realization rates or documentation scores.

6.4 DETAILED FINDINGS—RESIDENTIAL

6.4.1 Home Energy Efficiency 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%	18,512	18,512	100.0%	11.5%	35,615,375	35,615,375	100.0%	Good

Completed desk reviews*
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 PY2021 Home Energy Efficiency SOP evaluation efforts focused on desk reviews. The number of completed desk reviews for this program is listed above. Nine desk reviews were completed to check that measure data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated in accordance with the TRM.

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

Participant ID 1422023: The project included the installation of a new heat pump system. During the desk review, the EM&V team found that the ex-ante savings were calculated using the post-2006 deemed savings table. However, the EM&V team found that the existing system was manufactured before 2006 and adjusted the ex-post savings calculations accordingly, resulting in an increase in savings. Overall, the adjustments resulted in project-level realization rates of 100.0 percent and 108.6 percent for demand and energy savings, respectively.

Participant ID 1422116: The project included the installation of a new central air conditioner system. During the desk review, the EM&V team found that the new system's capacity was upsized by half a ton from the existing system. Ex-ante savings were claimed against the early retirement baseline; however, per the TRM, cooling savings should be claimed against the new construction baseline using the installed capacity. The EM&V team adjusted the cooling baseline resulting in a decrease in savings. Overall, the adjustments resulted in project-level realization rates of 36.9 percent and 37.3 percent for demand and energy savings, respectively.

Participant ID 1422558: The project included the installation of a new central air conditioner system. During the desk review, the EM&V team found that the new system's capacity was upsized by half a ton from the existing system. Ex-ante savings were claimed against the early retirement baseline; however, per the TRM, cooling savings should be claimed against the new construction baseline using the installed capacity. The EM&V team adjusted the cooling baseline resulting in a decrease in savings. Overall, the adjustments resulted in project-level realization rates of 37.1 percent and 37.3 percent for demand and energy savings, respectively.

Participant ID 1422131: The project included the installation of a new central air conditioner system. During the desk review, the EM&V team found that the ex-ante savings were calculated using the 2020 discount rate. The EM&V team adjusted the discount rate to the 2021 value in the ex-post calculation resulting in a slight decrease in savings. Overall, the adjustments resulted in project-level realization rates of 98.8 percent and 98.8 percent for demand and energy savings, respectively.

Participant ID 1423030: The project included the installation of a new central air conditioner system. During the desk review, the EM&V team found that the ex-ante savings were calculated using the 2020 discount rate. The EM&V team adjusted the discount rate to the 2021 value in the ex-post calculation resulting in a slight decrease in savings. Overall, the adjustments resulted in project-level realization rates of 98.8 percent and 98.8 percent for demand and energy savings, respectively.

Documentation Score

The EM&V team was able to verify key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects that had desk reviews. Project documentation included customer agreement, photos, specification sheets, certifications, and field notes. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

6.4.2 Hard-to-Reach 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
6.6%	15,502	15,502	100.0%	6.7%	20,879,661	20,879,661	100.0%	Good

Completed desk reviews*	Completed on-site M&V
5	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 PY2021 Hard-to-Reach SOP evaluation efforts focused on desk reviews and on-site M&V. The number of sampled and completed desk reviews and site visits for this program are listed above.

Overall, the EM&V team assessed ex-ante claimed energy and demand savings across the following two activities:

- For a sample of projects, desk reviews were completed to ensure that data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated per the TRM.
- On-site M&V was completed for a sample of projects to verify that measures remained installed and matched project documentation.

The EM&V team adjusted the claimed savings for four projects. One project had less than five percent adjustments compared to the originally claimed savings. Three projects had adjustments of greater than five percent compared to the originally claimed savings. Oncor accepted the evaluated results and matched the claimed savings for the three projects with significant adjustments; therefore, the final program realization rates are 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1430898: The project included the installation of a new central heat pump system. During the desk review, the EM&V team found that the new system capacity was downsized from the existing system. The EM&V team adjusted the capacity and used the downsized deemed savings resulting in an increase in savings. Overall, the adjustments resulted in project-level realization rates of 156.4 percent and 168.0 percent for demand and energy savings, respectively.

Participant ID 1431160: The project included the installation of a new heat pump system. During the desk review, the EM&V team found that the ex-ante savings were calculated using the post-2006 deemed savings table. However, the EM&V team found that the existing system was manufactured before 2006 and adjusted the ex-post savings calculations accordingly, resulting in an increase in savings. Overall, the adjustments resulted in project-level realization rates of 100.0 percent and 109.2 percent for demand and energy savings, respectively.

Participant ID 1431194: The project included the installation of a new heat pump system. During the desk review, the EM&V team found that the ex-ante savings were calculated using the post-2006 deemed savings table. However, the EM&V team found that the existing system was manufactured before 2006 and adjusted the ex-post savings calculations accordingly, resulting in an increase in savings. Overall, the adjustments resulted in project-level realization rates of 100.0 percent and 108.9 percent for demand and energy savings, respectively.

Participant ID 1431253: The project included the installation of a new central heat pump system. During the desk review, the EM&V team found that the ex-ante savings were calculated using an existing heat pump system's default remaining useful life value. However, when the existing system is an air conditioner, the default remaining useful life for an air conditioner system should be used. The EM&V team adjusted the remaining useful life in the ex-post calculation resulting in a slight increase in savings. Overall, the adjustments resulted in project-level realization rates of 100.0 percent and 100.2 percent for demand and energy savings, respectively.

Documentation Score

The EM&V team was able to verify key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects that had desk reviews. Project documentation included customer agreement, photos, specification sheets, certifications, and field notes. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

6.5 DETAILED FINDINGS—LOW-INCOME

6.5.1 Targeted Weatherization Low-Income 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
1.4%	3,251	3,251	100.0%	1.9%	6,029,852	6,029,852	100.0%	Good

Completed desk reviews*	Completed on-site M&V
3	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 PY2021 Targeted Weatherization Low-Income SOP evaluation efforts focused on desk reviews and on-site M&V. The number of sampled and completed desk reviews and site visits for this program are listed above.

Overall, the EM&V team assessed ex-ante claimed energy and demand savings across the following two activities:

- For a sample of projects, desk reviews were completed to ensure that data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated per the TRM.
- On-site M&V was completed for a sample of projects to verify that measures remained installed and matched project documentation.

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

Participant ID 1466717: The project included the installation of a new heat pump system. During the desk review, the EM&V team found that the ex-ante savings were calculated using the post-2006 deemed savings table. However, the EM&V team found that the existing system was manufactured before 2006 and adjusted the ex-post savings calculations accordingly, resulting in an increase in savings. Overall, the adjustments resulted in project-level realization rates of 100.0 percent and 109.5 percent for demand and energy savings, respectively.

Participant ID 1430752: The project included the installation of a new central heat pump system. During the desk review, the EM&V team found that the ex-ante savings were calculated using an existing heat pump system's default remaining useful life value. However, when the existing system is an air conditioner, the default remaining useful life for an air conditioner system should be used. The EM&V team adjusted the remaining useful life in the ex-post calculation resulting in a slight increase in savings. Overall, the adjustments resulted in project-level realization rates of 100.0 percent and 100.2 percent for demand and energy savings, respectively.

Participant ID 1466661: The project included the installation of a new central heat pump system. During the desk review, the EM&V team found that the ex-ante savings were calculated using an existing heat pump system's default remaining useful life value. However, when the existing system is an air conditioner, the default remaining useful life for an air conditioner system should be used. The EM&V team adjusted the remaining useful life in the ex-post calculation resulting in a slight increase in savings. Overall, the adjustments resulted in project-level realization rates of 100.0 percent and 100.2 percent for demand and energy savings, respectively.

Documentation Score

The EM&V team was able to verify key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects that had desk reviews. Project documentation included customer agreement, photos, specification sheets, AHRI certifications, and field notes. However, the documentation did not include low-income certification. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

6.6 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

6.6.1 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
43.9%	103,180	103,641	100.4%	0.1%	309,539	310,923	100.4%	Good

Completed desk reviews*
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. Claimed savings are conservative as they only include the amount of demand reduction in participation contracts.

The EM&V team evaluated the Oncor Commercial Load Management SOP by applying the technical reference manual (TRM) calculation methodology to interval meter data. The meter data were supplied in 15-minute increments. A single load management event occurred in PY2021 on June 17, 2021, from 3:00 p.m. to 6:00 p.m. (scheduled).

The EM&V team received the interval meter data and spreadsheets detailing the Oncor calculated baseline load, event load, and savings results for the 19 sponsors across 264 sites. Twenty-three sites had negative savings data or did not have any load data associated with them during the event. All sponsors had at least one site that curtailed during the scheduled event.

After the EM&V team applied the High 5 of 10 baseline calculation method, it was found that the evaluated kilowatt savings matched the kilowatt savings Oncor provided for all sites except those with negative savings. While reviewing individual meter savings differences, the EM&V team found that Oncor uses a conservative approach by not setting savings to zero in cases where the calculation methodology produced negative savings. Per the TRM, the negative savings can be set to zero for cases that produce negative savings.

After calculating the kilowatt savings, the kilowatt-hour savings for each participating site were calculated by multiplying the kilowatt reductions by the total number of event hours. Program-level savings were calculated by adding all site-level savings.

The table above shows both the EM&V team (evaluated) and Oncor's calculated kilowatt and kilowatt-hour savings. Evaluated savings for the Oncor Load Management SOP are 103,641 kW and 310,923 kWh. The realization rate for both kilowatt and kilowatt-hour is just over 100 percent, with a documentation score of *good*. **Oncor's contracted savings claimed in their Energy Efficiency Plan and Report (78,000 kW and 234,000 kWh) are conservative compared to their calculated kilowatt and kilowatt-hour savings.**

6.6.2 Residential Load Management Standard Offer 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
17.3%	40,739	40,739	100.0%	0.0%	122,216	122,217	100.0%	Good

Completed desk reviews*
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 Load Management SOP by applying the TRM calculation methodology to interval meter data. The meter data were supplied in 15-minute increments. A single demand response event occurred in PY2021 on June 17, 2021, from 3:00 p.m. to 6:00 p.m. (scheduled).

The EM&V team received the interval meter data and spreadsheets detailing the Oncor calculated baseline load, event load, and savings results for each service provider and meter. Additionally, Oncor provided documentation for meters that received zero savings from the calculation or had no meter data available during the event but were confirmed as having participated by the service provider. These meters totaled one percent of the program population and were included for each service provider by applying the average savings (per the TRM, savings may still be calculated for less than two percent of meters that fail to record data sufficient to apply the High 3 of 5 calculation method).

After the EM&V team applied the High 3 of 5 baseline calculation method, it was found that the evaluated kilowatt savings matched the kilowatt savings Oncor provided for all participating meters. The kilowatt-hour savings for each participating meter were calculated by multiplying the kilowatt reductions by the total number of event hours. Program-level savings were calculated by adding all meter-level savings.

The table above shows both the EM&V team (evaluated) and Oncor's (claimed) calculated kilowatt and kilowatt-hour savings. No adjustments were made to the program savings; however, a negligible difference in kilowatt and kilowatt-hour was a result of different rounding practices during calculations. Evaluated savings for the Oncor Residential Load Management SOP are 40,739 kW and 122,217 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

6.7 SUMMARY OF LOW EVALUATION PRIORITY PROGRAMS

Table 1110 summarizes claimed savings for Oncor's *low* evaluation priority programs in PY2021, including the programs' overall contribution to portfolio savings. *Low*-priority programs' claimed savings were verified against the final PY2021 tracking data provided to the EM&V team for the EM&V database.

Table 26. PY2021 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)
Retail Products MTP (Commercial)	2.5%	5,915	5,915	100.0%	9.7%	30,026,196	30,026,196	100.0%
Solar PV SOP (Residential)	0.9%	2,126	2,126	100.0%	2.2%	6,813,109	6,813,109	100.0%
Retail Products MTP (Residential)	10.0%	23,496	23,496	100.0%	37.4%	116,059,268	116,059,268	100.0%
Solar PV SOP (Commercial)	0.6%	1,460	1,460	100.0%	1.6%	5,003,812	5,003,812	100.0%
Residential New Home Construction MTP	0.4%	976	976	100.0%	0.4%	1,248,945	1,248,945	100.0%
Commercial HVAC Distributor MTP (Pilot)	0.0%	42	42	100.0%	0.0%	84,484	84,484	100.0%

7.0 SOUTHWESTERN ELECTRIC POWER COMPANY IMPACT 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 priorities for which claimed savings were verified through the evaluation, measurement, and verification (EM&V) database is included.

7.1 KEY FINDINGS

7.1.1 Evaluated Savings

SWEPCO's evaluated savings for program year (PY) 2021 were 8,857 in demand (kilowatt, kW) and 17,402,337 in energy (kilowatt-hour, kWh) savings. The overall kilowatt and kilowatt-hour 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 30), supporting healthy realization rates.

Table 27 shows the claimed and evaluated demand savings for SWEPCO's portfolio and broad customer sector and program categories. Residential and Load management results are based on census reviews, and therefore precisions calculations are not applicable (N/A).

Table 27. SWEPCO PY2021 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%	8,857	8,857	100.0%	N/A
Commercial	28.9%	2,564	2,564	100.0%	N/A
Residential	27.7%	2,457	2,457	100.0%	N/A
Load management*	43.3%	3,837	3,837	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 28 shows the claimed and evaluated energy savings for SWEPCO's portfolio and broad customer sector and program categories for PY2021.

Table 28. SWEPCO PY2021 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%	17,402,332	17,402,337	100.0%	N/A
Commercial	72.3%	12,581,370	12,581,370	100.0%	N/A
Residential	27.3%	4,758,685	4,758,685	100.0%	N/A
Load management*	0.4%	62,277	62,282	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 qualitative rating of good, fair, and limited associated with the level of program documentation received from the utility. SWEPCO received *good* documentation scores for all evaluated programs, except the Residential Standard offer program (SOP), which received a *fair* documentation score.

7.1.2 Cost-Effectiveness Results

SWEPCO's overall portfolio had a cost-effectiveness score of 3.5.

The more cost-effective programs were the Commercial Solutions MTP and the Commercial Standard Offer Program (SOP); the less cost-effective programs were the Load Management SOP and the Residential SOP. All of SWEPCO's programs were cost-effective in 2021.

The lifetime cost of evaluated savings was \$0.017 per kWh and \$12.80 per kW.

Table 29. SWEPCO Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total portfolio	3.52	3.52	3.23
Commercial	5.20	5.20	4.68
Commercial Solutions MTP	5.43	5.43	4.77
Commercial SOP	6.11	6.11	5.55
Open MTP	2.80	2.80	2.66
SCORE MTP	4.75	4.75	4.18

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Residential	2.24	2.24	2.11
Residential SOP	2.07	2.07	1.87
Hard-to-Reach SOP	2.51	2.51	2.51
Load management	1.58	1.58	1.58
Load Management SOP	1.58	1.58	1.58

7.2 EVALUATED SAVINGS DIFFERENCES

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings.

Table 30 summarizes savings differences identified by the EM&V team, which SWEPCO also used to adjust their claimed savings. The EM&V team requests that utilities make adjustments to projects when evaluated, and claimed savings differ by more than five percent. SWEPCO adjusted claimed savings for all projects with any differences found by the EM&V team and will include these adjustments in their May 1 filing.

Table 30. Evaluated and Claimed Savings Adjustments by Program

Program	Evaluated demand savings differences (kW)	Evaluated energy savings differences (kWh)
Commercial Solutions MTP	-2.50	-10,558.00
Commercial SOP	1.50	6,624.00
Open MTP ⁹	-2.40	-41,606.00
SCORE MTP	17.70	27,352.00
Residential SOP	0.50	349.60
Total	14.80	-17,838.40

7.3 DETAILED FINDINGS—COMMERCIAL

7.3.1 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
6.3%	557	557	100.0%	14.9%	2,599,104	2,599,104	100.0%	Good

⁹ Due to a keystroke error in SWEPCO's April 1, 2022 EEPR filing, the net evaluated energy savings difference for the Open MTP program is -39,122 kWh.

Completed desk reviews*	On-site M&V visit
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 PY2021 Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

The EM&V team adjusted the claimed savings for two projects. One of these projects had adjustments of greater than five percent compared to the originally claimed savings, and the other was very small. SWEPCO 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 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1477646: The energy efficiency project included interior LED lighting retrofits at a retail strip mall. Based on on-site observations, during the desk review and M&V on-site visit, the EM&V team added occupancy sensors in both the pre-install and post-install conditions to all interior lights. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 76 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 76 percent.

Participant ID 1478095: The energy efficiency project included interior LED lighting retrofits at a stand-alone retail superstore. During the desk review, the EM&V team adjusted the air conditioning type for the "shop" space use area from *air-conditioned* to *none* since these areas are typically not air-conditioned, and no documentation was provided to verify that air conditioning was present. These adjustments decreased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. The adjustments also decreased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Documentation Score

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

7.3.2 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
14.0%	1,243	1,243	100.0%	39.0%	6,780,621	6,780,621	100.0%	Good

Completed desk reviews*	On-site M&V visit
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 PY2021 Commercial SOP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

The EM&V team adjusted the claimed savings for three projects. Two projects had an adjustment 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 all projects; therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1487488: 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 made small adjustments to the wattages of several lights to match the DesignLights Consortium (DLC) Qualified Products List (QPL). However, the majority of the adjusted savings were a result of the control devices for all lights being adjusted from *none* to *occupancy sensor*, based on on-site observations. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 125 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 125 percent.

Participant ID 1489129: The energy efficiency project included the installation of interior and exterior LED lighting at a new construction manufacturing facility. During the desk review, the EM&V team adjusted the wattage of many lights to match the wattages in the DLC QPL. These adjustments increased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. The adjustments also increased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1537266: The energy efficiency project included interior lighting retrofits at a retail facility. During the desk review and on-site M&V visit, the EM&V team adjusted the wattages of one light to match the wattages in the DesignLights Consortium (DLC) Qualified Products List (QPL). This adjustment decreased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. The adjustments also decreased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Documentation Score

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

7.3.3 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
5.8%	510	510	100.0%	12.3%	2,148,909	2,148,909	100.0%	Good

Completed desk reviews*	On-site M&V visit
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 PY2021 SCORE MTP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

The EM&V team adjusted the claimed savings for two projects. Both projects had adjustments of 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 project with significant adjustment. Therefore, the final program realization rate is 100 percent for both kilowatt and kilowatt-hour. Further details of the EM&V findings are provided below.

Participant ID 1477663: The energy efficiency project included interior lighting retrofits at a high school. During the desk review and on-site M&V visit, the EM&V team adjusted the predominant building type from *Education: K-12 without summer session* to *Education: K-12 with summer session*, based on conversations with the site representative, who verified that the school does have a summer session. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 231 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 129 percent.

Participant ID 1478111: The energy efficiency project included interior and exterior lighting retrofits at a middle school. During the desk review and on-site M&V visit, the EM&V team adjusted the exterior building type from *Outdoor: athletic field and court* to *Outdoor: less than dusk-to-dawn* because the on-site visit verified that exterior lighting was under a canopy near the school building. This adjustment increased peak demand (kilowatt) savings and resulted in a realization rate of 105 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 102 percent.

Documentation Score

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

7.3.4 OPEN Market Transformation Program (MTP) (Medium Evaluation Priority)

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
2.9%	254	254	100.0%	6.0%	1,052,736	1,052,736	100.0%	Good

Completed desk reviews*	On-site M&V visit
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 PY2021 Small Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

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

Participant ID 1477501: The energy efficiency project included interior lighting retrofits at a commercial vehicle service center. During the desk review and on-site M&V visit, the EM&V team adjusted several lights' wattages to match the DLC QPL. Three different light fixtures were adjusted between one and five watts. In addition, the air conditioning type of the service area is adjusted from *air-conditioned* to *none*, based on on-site observations. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 95 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 98 percent.

Participant ID 1477503: The energy efficiency project included interior and exterior lighting retrofits at a commercial car dealership and vehicle service shop. During the desk review, the EM&V team adjusted the predominant building type from *retail strip/non-enclosed mall* to *service: excluding food*, based on the photos provided. In addition, the air conditioning type for the service area was adjusted from *air-conditioned* to *none* based on the photos provided, and one baseline fixture code was adjusted to match the photo documentation. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 98 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 85 percent.

Participant ID 1477589: The energy efficiency project included interior and exterior lighting retrofits at a commercial car dealership and vehicle service shop. During the desk review, the EM&V team adjusted the predominant building type from *Retail strip/non-enclosed mall* to *Mercantile: Non-24 Hour Stand-alone Retail*, based on the project description and photos provided. Two-line items of lights were also adjusted from the indoor building type to the *Outdoor: Dusk-to-Dawn* building type, based on the photos provided. In addition, the air conditioning type for the service area was adjusted from *air-conditioned* to *none* based on the photos provided. Finally, the EM&V team adjusted the wattages of several lights by one half or one watt to match the wattages in the DLC QPL. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 108 percent. The adjustments decreased energy (kilowatt-hour) savings and resulted in a realization rate of 92 percent.

Participant ID 1478029: The energy efficiency project included interior and exterior lighting retrofits at a retail facility. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of one light by half to match the wattage in the DLC QPL. Two lights were adjusted from the indoor building type to the *Outdoor: Dusk-to-Dawn* building type with *Photocell* controls, based on on-site observations. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 98 percent. The adjustments increased energy (kilowatt-hour) savings and resulted in a realization rate of 102 percent.

Participant ID 1478066: The energy efficiency project included interior and exterior lighting retrofits at a bus station. During the desk review, the EM&V team adjusted the predominant building type from *Service: Excluding Food* to *Public Assembly* because transportation terminals are detailed in the TRM to be classified as a public assembly. This adjustment decreased peak demand (kilowatt) savings and resulted in a realization rate of 88 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 93 percent.

Participant ID 1478069: The energy efficiency project included interior lighting retrofits at a manufacturing facility. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of one light by one watt to match the wattage in the DLC QPL. The air conditioning type for the paint and fab shop areas was adjusted from *air-conditioned* to *none*, based on on-site observations. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 92 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 96 percent.

Documentation Score

The EM&V team mostly verified key inputs and assumptions (e.g., lighting quantity, lighting wattage, QPL qualifications) for the six projects that had desk reviews because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications, pre-inspection and post-inspection notes, project savings calculators, and photographic documentation of existing and new lighting, which are significant efforts by the utility to verify equipment conditions and quantities. One project, however, did not include QPL quantifications, an invoice, or post-inspection notes, making it difficult to prove the purchase of the lights. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

7.4 DETAILED FINDINGS—RESIDENTIAL

7.4.1 Residential 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
14.2%	1,262	1,262	100.0%	15.4%	2,674,588	2,674,588	100.0%	Fair

Completed desk reviews*
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 PY2021 Residential SOP evaluation efforts focused on desk reviews. The number of sampled and completed desk reviews for this program is listed above. Six desk reviews were completed to check that measure data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated in accordance with the TRM.

The EM&V team adjusted the claimed savings for one project. SWEPCO accepted the evaluated results and matched the claimed savings for the projects with significant adjustments; therefore, the final program realization rate is 100 percent. Further details of the EM&V findings and adjustments are provided below.

- Participant ID 1466942:** The energy efficiency project included the implementation of ceiling insulation. During the desk review, the EM&V team could not reconcile the ex-ante savings and ex-post savings. Since an ex-ante calculator was not included in the documentation, the EM&V team could not verify the reasons for the savings gap. The ex-post savings were calculated using the deemed methodology in the TRM for ceiling insulation from R-8 to R-38, resulting in an increase in savings. Overall, the adjustments resulted in project-level realization rates of 132.3 percent and 132.3 percent for demand and energy savings, respectively.

Documentation Score

The EM&V team verified most key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects, with desk reviews. Project documentation included customer agreement, photos, field notes, and test results. However, the TRM requires additional documentation to claim electric resistance heating, which was not included in the documentation. The absence of electric resistance documentation could result in savings adjustments in the future. Overall, the EM&V team was mostly satisfied with the project documentation provided and assigned a program documentation score of *fair*.

7.4.2 Hard-to-Reach 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
13.5%	1,194	1,194	100.0%	12.0%	2,084,098	2,084,098	100.0%	Good

Completed desk reviews*	Completed 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 PY2021 Hard-to-Reach 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 did not have any adjustments from the desk reviews or the on-site M&V resulting in 100 percent realization rates.

Overall, the EM&V team assessed ex-ante claimed energy and demand savings across the following two activities:

- For a sample of projects, desk reviews were completed to ensure that data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated per the TRM.
- On-site M&V was completed for a sample of projects to verify that measures remained installed and matched project documentation.

Documentation Score

For all sampled projects, the EM&V team was able to verify key inputs and assumptions (e.g., pre- and post-condition results) for ceiling insulation, air infiltration, and duct efficiency. There was limited documentation for direct installs such as LEDs. Because sufficient documentation was provided for most of the measures across all the reviewed projects, the EM&V team assigned a program documentation score of *good*.

7.5 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

7.5.1 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
43.3%	3,837	3,837	100.0%	0.4%	62,277	62,282	100.0%	Good

Completed desk reviews*

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 technical reference manual (TRM) calculation methodology to interval meter data. The meter data was supplied in 15-minute increments at the meter level. Load management events in PY2021 occurred on the following dates and times:

- May 25, 2021, from 2:00 p.m. to 3:00 p.m. (scheduled),
- May 27, 2021, from 3:00 p.m. to 4:00 p.m. (scheduled),
- May 27, 2021, from 5:00 p.m. to 6:00 p.m. (scheduled),
- June 2, 2021, from 2:00 p.m. to 3:00 p.m. (scheduled),
- June 2, 2021, from 2:00 p.m. to 4:00 p.m. (scheduled),
- July 28, 2021, from 2:00 p.m. to 6:00 p.m. (unscheduled),
- July 30, 2021, from 2:00 p.m. to 6:00 p.m. (unscheduled),
- August 12, 2020, from 2:00 p.m. to 6:00 p.m. (unscheduled), and
- August 24, 2020, from 2:00 p.m. to 6:00 p.m. (unscheduled).

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

After the EM&V team applied the *High 5 of 10* baseline calculation method, it was found that the evaluated savings matched the savings SWEPCO provided for all sites. The kilowatt savings for each participating site corresponded to the weighted average across the four unscheduled events. The kilowatt-hour savings for each participating site were calculated by multiplying the kilowatt reductions of all events (including the scheduled event) by the total number of event hours. Program-level savings were calculated by adding all site-level savings.

The table above shows both the EM&V team (evaluated) and SWEPCO's (claimed) calculated kilowatt and kilowatt-hour savings. No adjustments were made to the program savings; however, a negligible difference in kilowatt and kilowatt-hour was a result of different rounding practices during calculations. Evaluated savings for the SWEPCO Load Management SOP are 3,837 kW and 62,282 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of good.

8.0 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 priorities for which claimed savings were verified through the evaluation, measurement, and verification (EM&V) database is included.

8.1 KEY FINDINGS

8.1.1 Evaluated Savings

TNMP's evaluated savings for program year (PY) 2021 were 11,631 in demand (kilowatt, kW) and 18,937,376 in energy (kilowatt-hour, kWh) savings. The overall kilowatt and kilowatt-hour portfolio realization rates are approximately 100 percent. TNMP was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (Table 34), supporting healthy realization rates.

Table 31 shows the claimed and evaluated demand savings for TNMP's portfolio and broad customer sector and program categories. Residential and load management results are based on census reviews, and therefore, precisions calculations are not applicable (N/A).

Table 31. TNMP PY2021 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%	11,631	11,631	100.0%	N/A
Commercial	20.8%	2,420	2,420	100.0%	N/A
Residential	30.3%	3,529	3,529	100.0%	N/A
Low-income	5.2%	605	605	100.0%	N/A
Load management*	43.7%	5,078	5,078	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 32 shows the claimed and evaluated energy savings for TNMP's portfolio and broad customer sector and program categories for PY2021.

Table 32. TNMP PY2021 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%	18,924,240	18,937,376	100.1%	N/A
Commercial	51.4%	9,734,891	9,748,027	100.3%	N/A
Residential	43.5%	8,228,200	8,228,200	100.0%	N/A
Low-income	5.1%	956,071	956,071	100.0%	N/A
Load management*	0.0%	5,078	5,078	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 qualitative rating of good, fair, and limited associated with the level of program documentation received from the utility. TNMP received *good* documentation scores for all evaluated programs, except the Residential SOP, which received a fair documentation score.

8.1.2 Cost-Effectiveness Results

TNMP's overall portfolio had a cost-effectiveness score of 3.0, or 3.3, excluding low-income programs.

The more cost-effective programs were the Commercial Solutions MTP and the SCORE/CitySmart MTP; the less cost-effective programs were the Load Management SOP and the Open for Small Business MTP. All of TNMP's programs were cost-effective in 2021.

The lifetime cost of evaluated savings was \$0.018 per kWh and \$13.59 per kW.

Table 33. TNMP Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total portfolio	3.02	3.02	2.70
Total portfolio excluding low-income programs	3.25	3.25	2.88
Commercial	4.02	4.02	3.58
Open for Small Business MTP	2.23	2.23	2.11
SCORE/CitySmart MTP	4.23	4.23	3.73
Commercial Solutions MTP	4.96	4.98	4.37

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Residential	2.88	2.88	2.53
High-Performance Homes MTP	2.76	2.76	1.93
Residential SOP	2.94	2.94	2.66
Hard-to-Reach SOP	2.73	2.73	2.73
Low-income	2.71	2.71	2.71
Low-Income Weatherization*	2.71	2.71	2.71
Load management	1.31	1.31	1.31
Load Management SOP	1.31	1.31	1.31

* The low-income program is evaluated using the savings-to-investment ratio (SIR).

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 34 summarizes claimed savings adjustments recommended by the EM&V team where project-level evaluated savings differed from claimed savings by 5 percent or more. Realization rates assume the following adjustments will be included in TNMP's June 1 filing. There may be differences between evaluated and claimed savings that did not result in a recommended adjustment because the difference is less than five percent.

Table 34. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF¹⁰ Filing)

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial Solutions MTP	3.80	-6,847.00
Open for Small Business MTP	-7.40	-33,001.00
SCORE/CitySmart MTP	-57.70	-216,273.00
Hard-to-Reach SOP	-0.50	-556.30
Low-Income Weatherization	-0.90	-1,191.00
Total	-62.70	-257,869.30

¹⁰ Energy efficiency cost recovery factor.

8.3 DETAILED FINDINGS—COMMERCIAL

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
8.8%	1,028	1,028	100.0%	26.7%	5,052,371	5,065,507	100.3%	Good

Completed desk reviews*	On-site M&V visit
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 PY2021 Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

The EM&V team adjusted the claimed savings for three projects. One project had a minor adjustment of less than five percent compared to the originally claimed savings, while the other two projects had an adjustment of greater than five percent compared to the originally claimed savings. TNMP accepted the evaluated results and adjusted savings for the lighting measures to match the claimed kilowatt-hour and kilowatt savings. The food service measures in one project were not adjusted. The final program realization rate rounds to 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1548196: The energy efficiency project included the installation of LED lighting and energy-efficient food service equipment at a fast-food restaurant. During the desk review, the EM&V team adjusted the food service savings to reflect what was calculated in the provided calculation file but not reported in the tracking system. The air conditioning type was adjusted from *none* to *air-conditioned* based on the post-inspection photos. The wattage of one light was adjusted to match the DesignLights Consortium (DLC) Qualified Products List (QPL). Finally, one light was disqualified because there is no DLC or ENERGY STAR® certification associated with the light, and the light does not qualify under "exempt fixtures" in the TRM. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 99 percent. The adjustments increased energy (kilowatt-hour) savings and resulted in a realization rate of 129 percent.

Participant ID 1548314: The energy efficiency project included interior lighting retrofit at a retail business. During the desk review, the EM&V team adjusted the pre-install lighting fixtures to match the pre-install inspection photos. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 81 percent. The adjustments decreased energy (kilowatt-hour) savings and resulted in a realization rate of 81 percent.

Participant ID 1548405: The energy efficiency project included interior and exterior lighting retrofit with a controls upgrade at a non-refrigerated warehouse. During the desk review and on-site M&V visit, the EM&V team adjusted the climate zone from 3 (*Houston*) to 2 (*Dallas*) and adjusted the wattage of one light to match the DLC QPL. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 103 percent. The adjustments decreased energy (kilowatt-hour) savings slightly, and the resulting realization rate was still 100 percent.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity; equipment capacity; QPL qualifications; Air Conditioning, Heating, and Refrigeration Institute (AHRI) certifications) for the six projects that had desk reviews because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications or AHRI certifications, pre-inspection 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*.

8.3.2 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
7.1%	828	828	100.0%	16.6%	3,137,786	3,137,786	100.0%	Good

Completed desk reviews*	On-site M&V visit
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 PY2021 SCORE/CitySmart MTP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

The EM&V team adjusted the claimed savings for three projects. One project had an adjustment of greater than five percent compared to the originally claimed savings, while two projects had minor adjustments of less than five percent compared to the originally claimed savings. TNMP accepted the evaluated results and adjusted savings to match the claimed kilowatt-hour and kilowatt savings for all projects. The final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1475267: The energy efficiency project included interior LED lighting retrofits at a K-12 school. During the desk review and on-site M&V visit, the EM&V team removed several line items in the calculator because pre-retrofit fixtures were found to be still in place. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 96 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 96 percent.

Participant ID 1475270: The energy efficiency project included interior and exterior LED lighting retrofits at a K-12 school. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of one LED fixture to match the DLC QPL. A discrepancy between claimed savings and the calculator documentation savings was also corrected. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 97 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 97 percent.

Participant ID 1477933: The energy efficiency project included the installation of LED lighting and HVAC equipment at a new construction high school. During the desk review, the EM&V team adjusted the building area to match the constructed area. This was lower than the submitted ex-ante area, which included a future expansion claimed in the building permit but not constructed. The LED lighting wattage remained unchanged. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 70 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 62 percent.

Documentation Score

The EM&V team verified key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for the four projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation at these sites included invoices, QPL qualifications, pre-install and post-install inspection notes, project savings calculators, and photographic documentation of existing and new equipment. Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. However, overall, the EM&V team assigned a program documentation score of *good*.

8.3.3 Open for Small Business Market Transformation Program (MTP) (Medium Evaluation Priority)

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%	563	563	100.0%	8.2%	1,544,734	1,544,734	100.0%	Good

Completed desk reviews*	On-site M&V visit
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 PY2021 Open for Small Business MTP evaluation efforts focused on desk reviews and on-site M&V visits. This program's sample of completed desk reviews and on-site M&V visits is listed above.

The EM&V team adjusted the claimed savings for three projects. Each of the three projects had adjustments of greater than five percent compared to the originally claimed savings. TNMP accepted the evaluated results and adjusted savings to match the claimed kilowatt-hour and kilowatt savings for all projects. The final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1388297: The energy efficiency project included the installation of weather stripping and door sweeps for exterior doors at a beauty salon. During the desk review and on-site M&V visit, the EM&V team adjusted the gap widths and door heights based on on-site observations. In addition, the length of door seals and sweeps on the front doors were adjusted to match the amount observed during the on-site M&V visit. A portion of the weather stripping was removed because the owner could not fully close the door when installed. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 80 percent. The adjustments decreased energy (kilowatt-hour) savings and resulted in a realization rate of 81 percent.

Participant ID 1388302: The energy efficiency project included interior and exterior LED lighting retrofits at a livestock farm. During the desk review and on-site M&V visit, the EM&V team adjusted the building type for all lighting fixtures from an interior *Service: Excluding Food* to split between interior *Office* and exterior *Outdoor: Less than Dusk-to-Dawn*. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 79 percent. The adjustments decreased energy (kilowatt-hour) savings and resulted in a realization rate of 70 percent.

Participant ID 1388432: The energy efficiency project included interior LED lighting retrofits at an auto retail and repair shop. During the desk review and on-site M&V visit, the EM&V team from *Manufacturing 1 Shift* to *Retail Excluding Mall/Strip* based on on-site findings. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 108 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 132 percent.

Documentation Score

The EM&V team verified key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for the six projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation at these sites included invoices, QPL qualifications, pre-install and post-install inspection notes, project savings calculators, and photographic documentation of existing and new equipment. Several projects, however, had fair documentation, including missing calculator files and illegible photo documentation of parameters. Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. However, overall, the EM&V team assigned a program documentation score of *good*.

8.4 DETAILED FINDINGS—RESIDENTIAL

8.4.1 Residential 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
20.8%	2,424	2,424	100.0%	30.4%	5,756,081	5,756,081	100.0%	Fair

Completed desk reviews*
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 PY2021 Residential SOP evaluation efforts focused on desk reviews. The number of completed desk reviews for this program is listed above. Six desk reviews were completed to check that measure data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated in accordance with the TRM.

The EM&V team did not have any adjustments from the desk reviews resulting in 100 percent realization rates.

Documentation Score

The EM&V team verified most key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects, with desk reviews. Project documentation included customer agreement, photos, and field notes. However, the TRM requires additional documentation to claim electric resistance heating, which was not included in the documentation. The absence of electric resistance documentation could result in savings adjustments in the future. Overall, the EM&V team was mostly satisfied with the project documentation provided and assigned a program documentation score of *fair*.

8.4.2 Hard-to-Reach 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%	535	535	100.0%	5.6%	1,061,272	1,061,272	100.0%	Good

Completed desk reviews*	Completed 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 PY2021 Hard-to-Reach SOP evaluation efforts focused on desk reviews and on-site M&V. The number of completed desk reviews and site visits for this program are listed above.

Overall, the EM&V team assessed ex-ante claimed energy and demand savings across the following two activities:

- For a sample of projects, desk reviews were completed to ensure that data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated per the TRM.
- On-site M&V was completed for a sample of projects to verify that measures remained installed and matched project documentation.

The EM&V team adjusted the claimed savings for one project. TNMP accepted the evaluated results and matched the claimed savings for the projects with significant adjustments; therefore, the final program realization rate is 100 percent. Further details of the EM&V findings and adjustments are provided below.

Participant ID 1485348: The project included the installation of ceiling insulation. During the desk review, the EM&V team found that the home heating type was calculated as half gas and half electric resistance. Using the photos and field notes, the EM&V team adjusted the heating type to a mix of gas and electric resistance space heating resulting in a decrease in savings. Overall, the adjustments resulted in project-level realization rates of 57.5 percent and 59.6 percent for demand and energy savings, respectively.

Documentation Score

The EM&V team was able to verify key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects that had desk reviews. Project documentation included customer agreement, photos, and field notes. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

8.5 DETAILED FINDINGS—LOW-INCOME

8.5.1 Low-Income Weatherization 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
5.2%	605	605	100.0%	5.1%	956,071	956,071	100.0%	Good

Completed desk reviews*	Completed on-site M&V
3	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 PY2021 Low-Income Weatherization evaluation efforts focused on desk reviews and on-site M&V. The number of sampled and completed desk reviews and site visits for this program are listed above.

Overall, the EM&V team assessed ex-ante claimed energy and demand savings across the following two activities:

- For a sample of projects, desk reviews were completed to ensure that data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated per the TRM.
- On-site M&V was completed for a sample of projects to verify that measures remained installed and matched project documentation.

The EM&V team adjusted the claimed savings for two projects. TNMP accepted the evaluated results and matched the claimed savings for the projects with significant adjustments; therefore, the final program realization rate is 100 percent. Further details of the EM&V findings and adjustments are provided below.

Participant ID 1482180: The project included the installation of ceiling insulation. During the desk review, the EM&V team found that the tracked R-value insulation installed was R-38. Using the photos and field notes, the EM&V team adjusted the final R-value to R-30, decreasing savings. Overall, the adjustments resulted in project-level realization rates of 92.7 percent and 97.5 percent for demand and energy savings, respectively.

Participant ID 1486770: The project included the installation of a new 2-ton heat pump system. During the desk review, the EM&V team found that the capacity of the existing system was 1.5 tons, and the system was upsized to 2 tons. Per the TRM, cooling savings should be claimed against the new construction baseline using the installed capacity, while heating savings can be claimed against the electric resistance baseline using the lower existing capacity. The EM&V team adjusted the cooling baseline resulting in a decrease in savings. Overall, the adjustments resulted in project-level realization rates of 73.2 percent and 75.7 percent for demand and energy savings, respectively.

Documentation Score

The EM&V team was able to verify key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects that had desk reviews. Project documentation included customer agreement, photos, and field notes. Documentation also included low-income certification. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

8.6 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

8.6.1 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
43.7%	5,078	5,078	100.0%	0.0%	5,078	5,078	100.0%	Good

Completed desk reviews*

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 TNMP Load Management SOP by applying the technical reference manual (TRM) calculation methodology to interval meter data. The meter data was supplied in 30-minute increments. Load management events in PY2021 occurred on the following dates and times:

- June 3, 2021, from 2:00 p.m. to 3:00 p.m. (scheduled); and
- June 16, 2021, from 3:00 p.m. to 4:00 p.m. (scheduled).

The EM&V team received the interval meter data and a spreadsheet that summarized the event-level savings for the seven sponsors across 63 sites. Eleven sites did not have any load data associated with them across both scheduled events. All sponsors had at least one site that curtailed during each event.

Since no unscheduled events were called in PY2021, TNMP calculated kilowatt savings for each site by applying the kilowatt reduction during the scheduled or test event (each site participated in only one 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 TNMP provided for all sites. The kilowatt savings for each participating site corresponded to the energy reduced during the scheduled event. The kilowatt-hour savings for each participating site were calculated by multiplying the kilowatt reductions by the total number of event hours. Program-level savings were calculated by adding all site-level savings.

The table above shows both the EM&V team (evaluated) and TNMP's (claimed) calculated kilowatt and kilowatt-hour savings. No adjustments were made to the program savings; however, a negligible difference in kilowatt and kilowatt-hour was a result of different rounding practices during calculations. Evaluated savings for the TNMP Load Management SOP are 5,078 kW and 5,078 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

8.7 SUMMARY OF LOW EVALUATION PRIORITY PROGRAMS

Table 35 summarizes claimed savings for TNMP's *low* evaluation priority programs in PY2021, including the programs' overall contribution to portfolio savings. *Low*-priority programs' claimed savings were verified against the final PY2021 tracking data provided to the EM&V team for the EM&V database.

Table 35. PY2021 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)
High-Performance Homes MTP	4.9%	569	569	100.0%	7.5%	1,410,848	1,410,848	100.0%

9.0 XCEL ENERGY 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 evaluation, measurement, and verification (EM&V) database is included.

9.1 KEY FINDINGS

9.1.1 Evaluated Savings

Xcel SPS's evaluated savings for program year (PY) 2021 were 10,054 in demand (kilowatt, kW) and 25,404,878 in energy (kilowatt-hour, kWh) savings. The overall kilowatt and kilowatt-hour 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 (Table 40), supporting healthy realization rates.

Table 36 shows the claimed and evaluated demand savings for Xcel SPS's portfolio and broad customer sector and program categories. Residential and load management results are based on census reviews, and therefore, precisions calculations are not applicable (N/A).

Table 36. Xcel SPS PY2021 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%	10,056	10,054	100.0%	N/A
Commercial	24.5%	2,464	2,462	99.9%	N/A
Residential	35.2%	3,541	3,541	100.0%	N/A
Low-income	2.8%	279	279	100.0%	N/A
Load management*	37.5%	3,772	3,771	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 Xcel SPS's portfolio and broad customer sector and program categories for PY2021.

Table 37. Xcel SPS PY2020 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%	25,412,059	25,404,878	100.0%	N/A
Commercial	49.1%	12,477,313	12,470,626	99.9%	N/A
Residential	47.7%	12,130,984	12,130,984	100.0%	N/A
Low-income	3.1%	788,674	788,183	99.9%	N/A
Load management*	0.1%	15,089	15,084	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 qualitative rating of good, fair, and limited associated with the level of program documentation received from the utility. Xcel SPS received *good* documentation scores for all evaluated programs, except the Smart Source Solar PV Market Transportation Program (MTP), which received a *fair* documentation score.

9.1.2 Cost-Effectiveness Results

Xcel SPS's overall portfolio had a cost-effectiveness score of 4.4, or 4.8 excluding low-income programs.

The more cost-effective programs were the Home Lighting MTP (residential and commercial) and the Smart Thermostat MTP Pilot; the less cost-effective programs were the Refrigerator Recycling MTP and the Load Management SOP. All of Xcel SPS's programs were cost-effective, except the Load Management program, with a 0.91 cost-effectiveness score in 2021.

The lifetime cost of evaluated savings was \$0.014 per kWh and \$10.96 per kW.

Table 38. Xcel SPS Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total portfolio	4.35	4.35	3.52
Total portfolio excluding low-income programs	4.78	4.78	3.83
Commercial	4.96	4.96	4.25
Commercial SOP	6.90	6.89	6.25
Retro-Commissioning MTP	3.75	3.75	3.38

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Small Commercial MTP	2.75	2.75	2.62
Home Lighting MTP	62.29	62.29	31.15
Residential	5.14	5.14	3.78
Residential SOP	2.30	2.30	2.08
Home Lighting MTP	11.62	11.62	5.81
Smart Thermostat MTP Pilot	10.92	10.92	9.18
Refrigerator Recycling MTP	1.70	1.70	1.70
Hard-to-Reach SOP	3.54	3.54	3.54
Low-income	2.40	2.39	2.39
Low-Income Weatherization*	2.40	2.39	2.39
Load management	0.91	0.91	0.91
Load Management SOP	0.91	0.91	0.91

* The low-income program is evaluated using the savings-to-investment ratio (SIR).

9.2 EVALUATED SAVINGS DIFFERENCES

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 39 summarizes evaluated savings differences identified by the EM&V team. The EM&V team requests that utilities make adjustments to projects when evaluated, and claimed savings differ by more than five percent. Table 40Table 41 summarizes the claimed savings adjustments in response to EM&V results expected to be included in Xcel SPS's May 1 filing. The claimed savings adjustments include all projects where evaluated savings met the five percent threshold.

Table 39. Evaluated Savings Differences by Program

Program	Evaluated demand savings differences (kW)	Evaluated energy savings differences (kWh)
Commercial SOP	-2.02	-14,591.00
Retro-Commissioning MTP	2.05	-10,412.00
Small Commercial MTP	0.36	1,503.00
Hard-to-Reach SOP	0.00	-44.30
Low-Income Weatherization	0.00	-491.00
Residential SOP	0.20	227.00
Load Management SOP	-1.00	-5.00
Total	-1.41	-23,813.50

Table 40. Claimed Savings Adjustments by Program (Included in EECRF Filing)

Program	Evaluated demand savings differences included in EECRF (kW)	Evaluated energy savings differences included in EECRF (kWh)
Commercial SOP	-0.11	-7,108.00
Retro-Commissioning MTP	2.05	-10,412.00
Small Commercial MTP MTP	0.17	706.00
Hard-to-Reach SOP	0.00	-44.30
Residential SOP	0.20	227.00
Total	2.30	-16,631.30

9.3 DETAILED FINDINGS—COMMERCIAL

9.3.1 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
9.0%	910	908	99.8%	16.3%	4,129,671	4,122,188	99.8%	Good

Completed desk reviews*	On-site M&V visit
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 PY2021 Commercial SOP evaluation efforts focused on desk reviews with on-site EM&V visits. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for five projects. All five projects had an adjustment of less than five percent. Xcel SPS accepted the evaluated results for one project and matched the claimed savings to the evaluated savings. The remaining four projects were not adjusted to those of the evaluations for all four projects, and therefore, the final program realization rate is 99.8 percent. Further details of the EM&V findings are provided below.

Participant ID 1452505: The energy efficiency project was an exterior LED lighting retrofit at a car dealership. During the desk review and on-site M&V visit, the EM&V team adjusted the wattage of lighting equipment to match the wattages in the DesignLights Consortium (DLC) Qualified Products List (QPL). One light (93096445 LED450BT56/740) was adjusted from 450W to 443W. The other light (GT-SWP01-80AA1-50) was adjusted from 80W to 81.5W. Finally, the control types for two line items were adjusted from *photo cell* to *timeclock*, based on on-site findings. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 101 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 101 percent.

Participant ID 1472565: The energy efficiency project was an interior and exterior LED retrofit at several school district buildings. During the desk review, the EM&V team adjusted the wattage of a few lights to match the wattages in the DLC QPL. One light (ETH-HBE-2-110W-5K) was adjusted from 109W to 108W. One light (ZY-T8-18W1200-BIXX 5000) was adjusted from 18W to 17.5W. Finally, one light (ESL-WP-45W-450) was adjusted from 45W to 43.5W. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 97 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 97 percent.

Participant ID 1473077: The energy efficiency project was the installation of interior and exterior LED lighting fixtures at a new construction public assembly building. During the desk review, the EM&V team adjusted the wattages of several lights to match the wattages in the DLC QPL. Several fixtures also were replaced during construction, which resulted in slightly different wattages. One adjustment was for rounding to the nearest half-watt, while seven adjustments were greater than 1.0 W per fixture or lamp. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 101 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 101 percent.

Participant ID 1542681: The energy efficiency project was the interior LED retrofit at a retail department store. During the desk review and on-site EM&V visit, the M&V team adjusted the wattages of several lights to match the wattages in the DLC QPL. The adjustments ranged from 0.5 to 2-watt adjustments. These adjustments increased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. The adjustments also increased energy (kilowatt-hour) savings but resulted in a realization rate that rounded to 100 percent.

Participant ID 1545229: The energy efficiency project was an interior and exterior LED retrofit at a retail gas station. During the desk review and on-site M&V visit, the EM&V team adjusted the wattages of several lights to match the wattages in the DLC QPL. One light (ELFD2S6740C) was adjusted from 27W to 33W. One light (CPY250-A--xx-D-E) was adjusted from 145W to 143W. Finally, the EM&V team did not allow the custom hours for a standardized building operation and adjusted the calculation to use the *non-24-hour convenience store* prescribed building type. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 97 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 76 percent.

Documentation Score

The EM&V team was mostly able to verify key inputs and assumptions (e.g., equipment quantity; QPL qualifications) for the six projects that had desk reviews because sufficient documentation was provided for the sites. Project documentation included invoices, specification sheets, QPL qualifications, pre-inspection 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 Retro-Commissioning Market Transformation Program (MTP) (Medium Evaluation Priority)

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%	924	924	100.0%	20.4%	5,188,299	5,188,299	100.0%	Good

Completed desk reviews*	On-site M&V visit
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 PY2021 Retro-Commissioning MTP evaluation efforts focused on desk reviews with on-site M&V visits. The sample of completed desk reviews for this program is 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 energy savings. Xcel SPS accepted the evaluated results and matched the claimed savings for the projects with significant adjustments; therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1548092: The project included upgrading equipment in a new construction veterinary school's lighting and HVAC system. During the desk review and on-site M&V visit, the EM&V team adjusted the new construction building type from *healthcare/clinic* to *school/university* and the predominant building type from *healthcare: outpatient* to *education* in the lighting calculation because the engineering drawings showed the predominant building type to be consistent with a university campus. A couple of adjustments were also made to the lighting. One light (24EN-LD2-67-UNV-L840-CD1-U) was adjusted from 50W to 56W to match the wattage in the DLC QPL. One light (S124DR-S795D840-ETG4F0-1-UDD-F-W) was adjusted to *non-qualified* because it could not be located in the DLC QPL. These adjustments decreased peak demand (kilowatt) savings but resulted in a realization rate that rounded to 100 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 91 percent.

Participant ID 1548094: The project included upgrading equipment in a new construction high school's lighting, HVAC system, and food service equipment. During the desk review, the EM&V team adjusted the wattage of a few lights to match the wattages in the DLC QPL. Several lighting wattages were adjusted by 0.5 watts, and one light (PEL2-40LH-FAW-EDU-LHVQM5) was adjusted from 158W to 52W. Two lights were adjusted from *non-qualified* to *DLC qualified* because it was located in the DLC QPL. In addition, changes were made to the food service equipment parameters. The dishwasher rack's per day was adjusted from 280 to 400, as specified in the TRM for a single tank conveyor type dishwasher. The commercial ice maker quantity was adjusted from 1 to 2 to match the actual quantity installed on-site. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 108 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 109 percent.

Documentation Score

The EM&V team was able to verify key inputs and assumptions, including the project scope, completed adjustments, equipment efficiencies, and operating parameters for all six projects that had desk reviews. Project documentation included calculations, EM&V plans, engineering drawings, and photos. Although invoices were missing for several projects, generally, the documentation contained all the key parameters and required additional effort to determine the project scope and impact. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

9.3.3 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
2.3%	231	231	100.1%	4.4%	1,117,330	1,118,127	100.1%	Limited

Completed desk reviews*	On-site M&V visit
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 PY2021 Small Commercial MTP evaluation efforts focused on desk reviews with on-site M&V visits. The sample of completed desk reviews for this program is listed above.

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

Participant ID 1452862: The energy efficiency project was a new construction office building that installed interior LED lighting. During the desk review and on-site M&V visit, the EM&V

team adjusted the predominant building type from *education* to *office* based on on-site observations. In addition, one light (81964) was adjusted from 50W to 30W. These adjustments decreased peak demand (kilowatt) savings and resulted in a realization rate of 89 percent. The adjustments also decreased energy (kilowatt-hour) savings and resulted in a realization rate of 89 percent.

Participant ID 1473855: The energy efficiency project was a retrofit of a community center office that installed interior LED lighting. During the desk review, the EM&V team adjusted the wattages of several lights to match the wattages in the DLC QPL. One light (S39916) was adjusted from 14.5W to 14W. One light (552101052) was adjusted from 100W to 99W. These adjustments increased peak demand (kilowatt) savings and resulted in a realization rate of 101 percent. The adjustments also increased energy (kilowatt-hour) savings and resulted in a realization rate of 101 percent.

Documentation Score

The documentation for the six projects with desk reviews was largely lacking, which did not allow for savings verification or adjustments beyond lighting wattages for some projects. Missing documentation included calculator files, post-installation photos, invoices, QPL qualifications, and inspection notes. Complete documentation enhances the accuracy and transparency of project savings and ease of evaluation. Overall, the EM&V team assigned a program documentation score of *limited*.

9.4 DETAILED FINDINGS—RESIDENTIAL

9.4.1 Residential Standard Offer Program (SOP) (Medium Evaluation Priority)

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
3.2%	324	324	100.0%	3.4%	855,191	855,191	100.0%	Good

Completed desk reviews*
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 PY2021 Residential SOP evaluation efforts focused on desk reviews. The number of sampled and completed desk reviews for this program is listed above. Four desk reviews were completed to check that measure data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated in accordance with the TRM.

The EM&V team adjusted the claimed savings for one project. Xcel SPS accepted the evaluated results and matched the claimed savings for the projects with significant adjustments; therefore,

the final program realization rate is 100 percent. Further details of the EM&V findings and adjustments are provided below.

Participant ID 1447268: The energy efficiency project included the implementation of a new central air conditioner. During the desk review, the EM&V team found that the ex-ante savings calculation assumed a new construction baseline; however, the project documentation and tracking system both state this is a replace-on-burnout (ROB) project. The ex-post savings were calculated using the ROB baseline, resulting in an increase in savings. Overall, the adjustments resulted in project-level realization rates of 148.8 percent and 149.2 percent for demand and energy savings, respectively.

Documentation Score

The EM&V team was able to verify key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects that had desk reviews. Project documentation included customer agreement, photos, and certifications. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

9.4.2 Hard-to-Reach 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
11.9%	1,198	1,198	100.0%	14.9%	3,779,061	3,779,061	100.0%	Good

Completed desk reviews*	Completed 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 PY2021 Hard-to-Reach SOP evaluation efforts focused on desk reviews and on-site M&V. The number of sampled and completed desk reviews and site visits for this program are listed above.

Overall, the EM&V team assessed ex-ante claimed energy and demand savings across the following two activities:

- For a sample of projects, desk reviews were completed to ensure that data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated per the TRM.
- On-site M&V was completed for a sample of projects to verify that measures remained installed and matched project documentation.

The EM&V team adjusted the claimed savings for two projects. Xcel SPS accepted the evaluated results and matched the claimed savings for the projects with significant adjustments; therefore, the final program realization rate is 100 percent. Further details of the EM&V findings and adjustments are provided below.

Participant ID 1447075: The energy efficiency project included the implementation of air infiltration and ceiling insulation. During the desk review, the EM&V team found that the home was heated and cooled by electric resistance space heaters and room ACs. However, the ex-ante savings calculation did not apply the appropriate adjustment factors for space heating and cooling for envelope measures. The ex-post savings were calculated using the adjustment factors, resulting in a decrease in savings. Overall, the adjustments resulted in project-level realization rates of 97.2 percent and 87.4 percent for demand and energy savings, respectively.

Participant ID 1447217: The energy efficiency project included the implementation of air infiltration, duct sealing, and LED lighting. During the desk review, the EM&V team found that the duct blaster test-out result was 49 CFM from the manometer photo. However, the tracking data stated a test-out result of 95 CFM, and ex-ante savings calculated savings using a test-out result of 95 CFM. The ex-post savings were calculated using the test-out result in the photo documentation, 49 CFM, resulting in an increase in savings. Overall, the adjustments resulted in project-level realization rates of 103.2 percent and 104.7 percent for demand and energy savings, respectively.

Documentation Score

The EM&V team verified most key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects, with desk reviews. Project documentation included customer agreement, photos, test results, and certifications. However, the TRM requires additional documentation to claim electric resistance heating, which was not included in the documentation. The absence of electric resistance documentation could result in savings adjustments in the future. Overall, the EM&V team was mostly satisfied with the project documentation provided and assigned a program documentation score of *good*.

9.5 DETAILED FINDINGS—LOW-INCOME

9.5.1 Low-Income Weatherization 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
2.8%	279	279	100.0%	3.1%	788,674	788,183	99.9%	Fair

Completed desk reviews*	Completed on-site M&V
3	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 PY2021 Low-Income Weatherization program evaluation efforts focused on desk reviews and on-site M&V. The number of sampled and completed desk reviews and site visits for this program are listed above.

Overall, the EM&V team assessed ex-ante claimed energy and demand savings across the following two activities:

- For a sample of projects, desk reviews were completed to ensure that data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated per the TRM.
- On-site M&V was completed for a sample of projects to verify that measures remained installed and matched project documentation.

The EM&V team adjusted the claimed savings for all three projects. Xcel SPS did not adjust the claimed savings for the projects under the five percent adjustment threshold; therefore, the overall desk review realization rates are 99.5 percent and 97.3 percent for demand and energy savings, respectively. Further details of the EM&V findings and adjustments are provided below.

Participant ID 1454627: The energy efficiency project was an early retirement project and included the implementation of a new central heat pump system. During the desk review, the EM&V team could not reconcile the ex-ante savings and ex-post savings. Since an ex-ante calculator was not included in the documentation, the EM&V team could not verify the reasons for the savings gap. The ex-post savings were calculated using the weighted methodology in the TRM, resulting in a slight decrease in savings. Overall, the adjustments resulted in project-level realization rates of 100.0 percent and 97.4 percent for demand and energy savings, respectively.

Participant ID 1454642: The energy efficiency project included the implementation of ceiling insulation, solar screens, and LED lighting. The EM&V team found limited documentation of key parameters for this project. The ex-ante ceiling insulation savings were calculated assuming an installed insulation rating of R-38. However, the audit form with recommended measures found in the documentation indicated R-33. Since there was no documentation to confirm R-38 was installed, the EM&V team calculated savings using R-33 resulting in a decrease in savings. Overall, the adjustments resulted in project-level realization rates of 97.2 percent and 98.1 percent for demand and energy savings, respectively.

Participant ID 1454682: The energy efficiency project was an early retirement project and included the implementation of a new central heat pump system. During the desk review, the EM&V team could not reconcile the ex-ante savings and ex-post savings. Since an ex-ante calculator was not included in the documentation, the EM&V team could not verify the reasons for the savings gap. The ex-post savings were calculated using the weighted methodology in the TRM, resulting in a slight decrease in savings. Overall, the adjustments resulted in project-level realization rates of 100.0 percent and 97.0 percent for demand and energy savings, respectively.

Documentation Score

The EM&V team verified some key inputs and assumptions, including the project scope, HVAC equipment specifications, and income eligibility verification forms for all sampled projects with desk reviews. Project documentation included customer agreement, nameplate photos, and AHRI certifications. There was limited to no documentation for solar screens, LEDs, and ceiling insulation. Overall, the EM&V team was somewhat satisfied with the project documentation provided and assigned a program documentation score of *fair*.

9.6 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

9.6.1 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
37.5%	3,772	3,771	100.0%	0.1%	15,089	15,084	100.0%	Good

Completed desk reviews*
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 electric service identifier ID (ESIID) level. In PY2021, only one load management event occurred on July 29, 2021, from 2:00 p.m. to 6:00 p.m. (scheduled).

The EM&V team received the interval meter data and a spreadsheet that summarized the event-level savings for the nine sponsors across 19 sites. Six sites did not have any load data associated with them for the event. All sponsors but one had at least one site that curtailed during the 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 Xcel SPS provided for all sites. The kilowatt savings for each participating site corresponded to the energy reduced during the scheduled event. The kilowatt-hour savings for each participating site were calculated by multiplying the kilowatt reductions by the total number of event hours. Program-level savings were calculated by adding all site-level savings.

The table above shows both the EM&V team (evaluated) and SWEPCO's (claimed) calculated kilowatt and kilowatt-hour savings. No adjustments were made to the program savings; however, a negligible difference in kilowatt and kilowatt-hour was a result of different rounding practices during calculations. Evaluated savings for the Xcel SPS Load Management SOP are 3,771 kW and 15,084 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

9.7 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

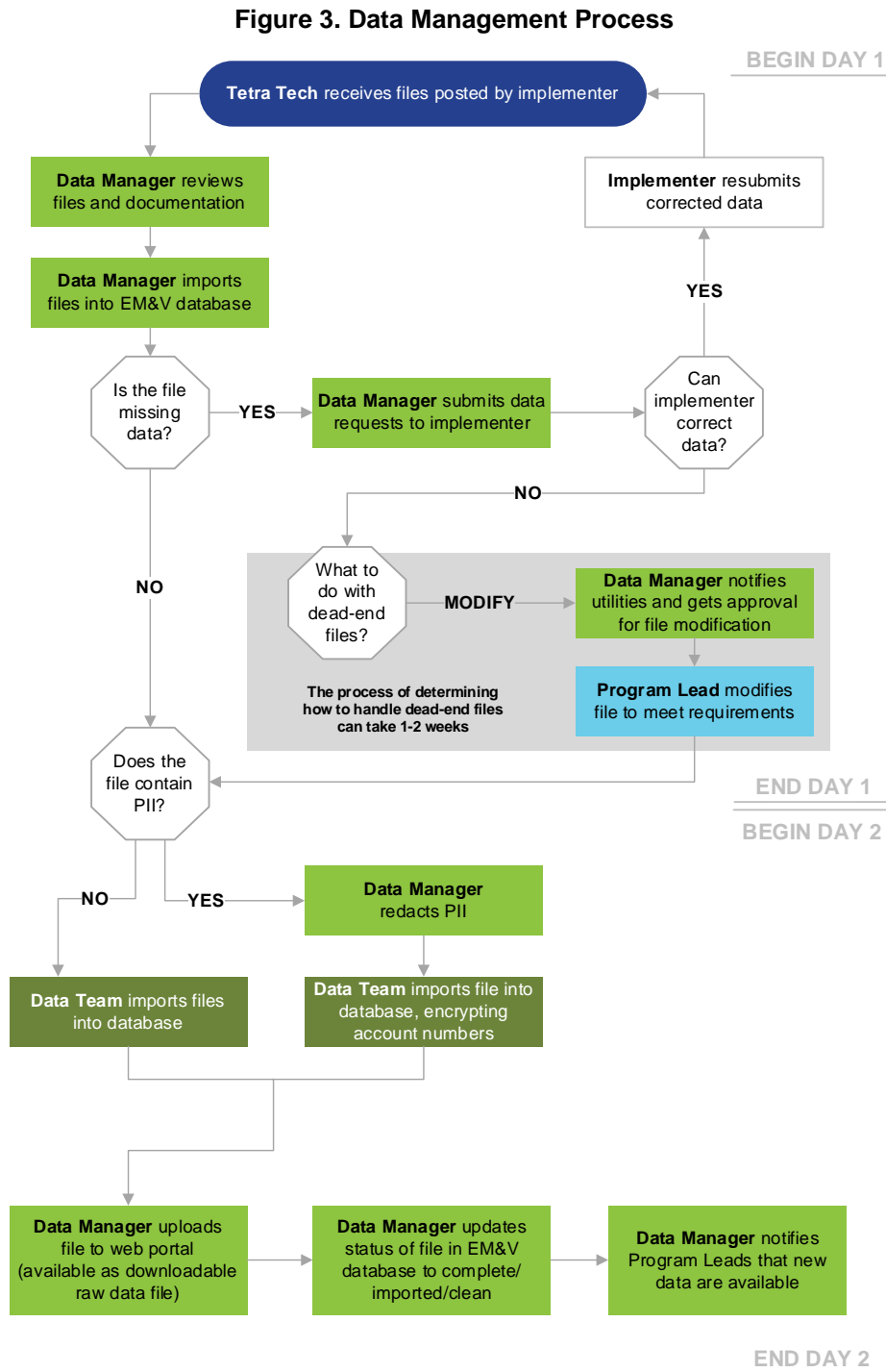
Table 41 summarizes claimed savings for Xcel SPS's programs in PY2021 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2021 tracking data provided to the EM&V team for the EM&V database.

Table 41. PY2021 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 (Commercial)	4.0%	400	400	100.0%	8.0%	2,042,013	2,042,013	100.0%
Home Lighting MTP (Residential)	20.0%	2,008	2,008	100.0%	26.7%	6,789,241	6,789,241	100.0%
Refrigerator Recycling MTP	0.1%	12	12	100.0%	0.4%	91,414	91,414	100.0%
Smart Thermostat MTP Pilot	0.0%	0	0	0.0%	2.4%	616,077	616,077	100.0%

APPENDIX A: DATA MANAGEMENT PROCESS

Figure 3 details the data management process.



APPENDIX B: COST-EFFECTIVENESS CALCULATIONS

This appendix describes the calculations used for modeling cost-effectiveness. This approach provides the Public Utility Commission of Texas (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 Energy Efficiency Plan and Reports, filed on April 1, 2020.¹¹ 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.

¹¹ 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 (R&D) 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 the 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 savings-to-investment ratio (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 which 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 42 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 PUCT.

Table 42. Average Energy Cost by Utility

Utility	Average kWh rate
AEP Texas	\$0.12
CenterPoint	\$0.13
Oncor	\$0.12
TNMP	\$0.13
Xcel SPS	\$0.12

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 determines the NTG ratios through primary research periodically (approximately every 4 to 5 years), as indicated in the table below. NTG ratios were updated for Residential SOP, Commercial SOP, and Commercial MTP in 2022. These values are included in Volume 1 of this report but are not included in the table below. They will be applied in 2023, starting with the PY2022 EM&V.

Table 43. Net-to-Gross Ratios Used to Calculate Cost-Effectiveness

Program	kWh NTG	kW NTG	Research year
Commercial			
Commercial SOP	0.91	0.89	2018
Commercial MTP (including SCORE/CitySmart MTP)	0.86	0.99	2018
Solar PV SOP	1.01	1.01	2019
Small Business Program	0.95	0.95	2019
Upstream Lighting	0.90	0.90	2020
Retro-Commissioning	0.90	0.90	2019
Residential			
Residential SOP	0.92	0.86	2018
Solar PV SOP	0.96	0.95	2018
New Homes	0.70	0.70	2020
Upstream Lighting	0.90	0.90	2020
A/C Tune-Up/Residential MTP	0.80	0.80	2019
Hard-to-Reach SOP	1.00	1.00	N/A—industry standard is to set at 1.0
Midstream MTP	0.84	0.84	2019
Appliance Recycling	0.79	0.79	2018
Low-income			
Targeted Low-Income	1.00	1.00	N/A—industry standard is to set at 1.0
Load management			
Commercial Load Management SOP	1.00	1.00	N/A—industry standard is to set at 1.0
Residential Load Management SOP	1.00	1.00	N/A—industry standard is to set at 1.0

APPENDIX C: QUALITY ASSURANCE/QUALITY CONTROL PROTOCOLS

This appendix documents the quality assurance/quality control (QA/QC) protocols established for the PUCT Evaluation, Measurement, and Verification (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 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 net-to-gross (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—program year (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 Technical Reference Manual (TRM) Volume 1. The QA/QC team will develop a checklist of tables to be cross-checked 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