

Public Utility Commission of Texas

# Volume 2. Utility-Specific Energy Efficiency Portfolio Report Program Year 2020





# TETRA TECH

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# TABLE OF CONTENTS

---

- 1.0 INTRODUCTION..... 1**
  - 1.1 Report Organization ..... 2
  - 1.2 Evaluation Approach ..... 2
    - 1.2.1 Implementing Impact Evaluations ..... 2
    - 1.2.2 Cost-Effectiveness Testing ..... 5
    - 1.2.3 Reporting..... 6
- 2.0 AMERICAN ELECTRIC POWER TEXAS CENTRAL COMPANY  
IMPACT EVALUATION RESULTS ..... 8**
  - 2.1 Key Findings ..... 8
    - 2.1.1 Evaluated Savings..... 8
    - 2.1.2 Cost-Effectiveness Results ..... 9
  - 2.2 Claimed Savings Adjustments ..... 10
  - 2.3 Detailed Findings—Commercial ..... 11
    - 2.3.1 Commercial Solutions Market Transformation Program (MTP) ..... 11
    - 2.3.2 Commercial Standard Offer Program (SOP) ..... 12
    - 2.3.3 SCORE/CitySmart Market Transformation Program (MTP) ..... 13
  - 2.4 Detailed Findings—Load Management (Medium Evaluation Priority) ..... 14
    - 2.4.1 Load Management Standard Offer Program (SOP) ..... 14
  - 2.5 Summary Of Cross-Sector Evaluated Programs..... 15
    - 2.5.1 Smart Source Solar PV Market Transformation Program (MTP) ..... 15
  - 2.6 Summary Of Tracking-System-Only Evaluated Programs ..... 16
  - 2.7 Summary Of Low Evaluation Priority Programs ..... 17
- 3.0 AMERICAN ELECTRIC POWER TEXAS NORTH COMPANY  
IMPACT EVALUATION RESULTS ..... 18**
  - 3.1 Key Findings ..... 18
    - 3.1.1 Evaluated Savings..... 18
    - 3.1.2 Cost-Effectiveness Results ..... 19
  - 3.2 Claimed Savings Adjustments ..... 20
  - 3.3 Detailed Findings—Commercial ..... 21
    - 3.3.1 Commercial Solutions Market Transformation Program (MTP) ..... 21
    - 3.3.2 Commercial Standard Offer Program (SOP) ..... 22
    - 3.3.3 SCORE/CitySmart Market Transformation Program (MTP) ..... 23

3.4 Detailed Findings—Load Management (Medium Evaluation Priority) .....	23
3.4.1 Load Management Standard Offer Program (SOP) .....	23
3.5 Summary Of Cross-Sector Evaluated Programs.....	24
3.5.1 Smart Source Solar PV Market Transformation Program (MTP).....	24
3.6 Summary of Tracking-System-Only Evaluated Programs .....	25
3.7 Summary of Low Evaluation Priority Programs.....	26
<b>4.0 CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC</b>	
<b>    IMPACT EVALUATION RESULTS.....</b>	<b>27</b>
4.1 Key Findings .....	27
4.1.1 Evaluated Savings.....	27
4.1.2 Cost-Effectiveness Results .....	28
4.2 Claimed Savings Adjustments .....	29
4.3 Detailed Findings—Commercial .....	30
4.3.1 Commercial Market Transformation Program (MTP) (SCORE, Healthcare, Data Center) .....	30
4.3.2 Commercial Standard Offer Program (SOP) .....	32
4.3.3 Retro-Commissioning Market Transformation Program (MTP) .....	33
4.4 Detailed Findings—Residential.....	34
4.4.1 Smart Thermostat Program .....	34
4.5 Detailed Findings—Load Management (Medium Evaluation Priority) .....	35
4.5.1 Large Commercial Load Management Standard Offer Program (SOP) .....	35
4.5.2 Residential Demand Response Program .....	36
4.6 Summary of Tracking-System-Only Evaluated Programs .....	36
4.7 Summary of Low Evaluation Priority Programs.....	37
<b>5.0 EL PASO ELECTRIC COMPANY IMPACT EVALUATION RESULTS.....</b>	<b>38</b>
5.1 Key Findings .....	38
5.1.1 Evaluated Savings.....	38
5.1.2 Cost-Effectiveness Results .....	39
5.2 Claimed Savings Adjustments .....	40
5.3 Detailed Findings—Commercial .....	41
5.3.1 Large Commercial and Industrial (C&I) Solutions Market Transformation Program (MTP).....	41
5.3.2 Texas SCORE Market Transformation Program (MTP) .....	42

5.4 Detailed Findings—Load Management (Medium Evaluation Priority) .....	43
5.4.1 Commercial Load Management Standard Offer Program (SOP).....	43
5.4.2 Residential Load Management Market Transformation Program (MTP).....	44
5.5 Summary of Tracking-System-Only Evaluated Programs .....	45
<b>6.0 ENTERGY TEXAS, INC. IMPACT EVALUATION RESULTS .....</b>	<b>46</b>
6.1 Key Findings .....	46
6.1.1 Evaluated Savings .....	46
6.1.2 Cost-Effectiveness Results .....	47
6.2 Claimed Savings Adjustments .....	48
6.3 Detailed Findings—Commercial .....	49
6.3.1 Commercial Solutions Market Transformation Program (MTP) .....	49
6.4 Detailed Findings—Load Management (Medium Evaluation Priority) .....	51
6.4.1 Load Management Standard Offer Program (SOP) .....	51
6.5 Summary of Tracking-System-Only Evaluated Programs .....	52
<b>7.0 ONCOR ELECTRIC DELIVERY, LLC IMPACT EVALUATION RESULTS.....</b>	<b>53</b>
7.1 Key Findings .....	53
7.1.1 Evaluated Savings .....	53
7.1.2 Cost-Effectiveness Results .....	54
7.2 Claimed Savings Adjustments .....	55
7.3 Detailed Findings—Commercial .....	56
7.3.1 Commercial Standard Offer Program (SOP) (Custom and Basic) .....	56
7.3.2 Retro-Commissioning Market Transformation Program (MTP) .....	57
7.4 Detailed Findings—Cross-Sector .....	58
7.4.1 Retail Platform Market Transformation Program (MTP) .....	58
7.4.2 Solar PV Standard Offer Program (SOP).....	59
7.5 Detailed Findings—Load Management (Medium Evaluation Priority) .....	60
7.5.1 Commercial Load Management Standard Offer Program (SOP).....	60
7.5.2 Residential Demand Response Standard Offer Program (SOP) .....	61
7.6 Summary of Tracking-System-Only Evaluated Programs .....	61
7.7 Summary of Low Evaluation Priority Programs.....	62

<b>8.0 SOUTHWESTERN ELECTRIC POWER COMPANY IMPACT EVALUATION RESULTS ..</b>	<b>63</b>
8.1 Key Findings .....	63
8.1.1 Evaluated Savings .....	63
8.1.2 Cost-Effectiveness Results .....	64
8.2 Claimed Savings Adjustments .....	65
8.3 Detailed Findings—Commercial .....	66
8.3.1 Commercial Solutions Market Transformation Program (MTP) .....	66
8.3.2 Commercial Standard Offer Program (SOP) .....	67
8.3.3 SCORE Market Transformation Program (MTP) .....	68
8.4 Detailed Findings—Load Management (Medium Evaluation Priority) .....	69
8.4.1 Load Management Standard Offer Program (SOP) .....	69
8.5 Summary of Tracking-System-Only Evaluated Programs .....	70
<b>9.0 TEXAS-NEW MEXICO POWER COMPANY IMPACT EVALUATION RESULTS .....</b>	<b>71</b>
9.1 Key Findings .....	71
9.1.1 Evaluated Savings .....	71
9.1.2 Cost-Effectiveness Results .....	72
9.2 Claimed Savings Adjustments .....	73
9.3 Detailed Findings—Commercial .....	74
9.3.1 Commercial Solutions Market Transformation Program (MTP) .....	74
9.3.2 SCORE/CitySmart Market Transformation Program (MTP) .....	75
9.4 Detailed Findings—Load Management (Medium Evaluation Priority) .....	76
9.4.1 Load Management Standard Offer Program (SOP) .....	76
9.5 Summary Of Tracking-System-Only Evaluated Programs .....	77
9.6 Summary of Low evaluation Priority Programs .....	78
<b>10.0 XCEL SOUTHWESTERN PUBLIC SERVICE COMPANY</b>	
<b>IMPACT EVALUATION RESULTS .....</b>	<b>79</b>
10.1 Key Findings .....	79
10.1.1 Evaluated Savings .....	79
10.1.2 Cost-Effectiveness Results .....	81
10.2 Claimed Savings Adjustments .....	82
10.3 Detailed Findings—Commercial .....	82
10.3.1 Commercial Standard Offer Program (SOP) .....	82
10.3.2 Retro-Commissioning Market Transformation Program (MTP).....	84
10.4 Detailed Findings—Residential.....	85
10.4.1 Residential Smart Thermostat Market Transformation Program (MTP).....	85



10.5 Detailed Findings—Load Management (Medium Evaluation Priority) .....	85
10.5.1 Load Management Standard Offer Program (SOP) .....	85
10.6 Summary of Tracking-System-Only Evaluated Programs .....	87
<b>APPENDIX A: DATA MANAGEMENT PROCESS.....</b>	<b>A-1</b>
<b>APPENDIX B: COST-EFFECTIVENESS CALCULATIONS .....</b>	<b>B-1</b>
<b>APPENDIX C: QUALITY ASSURANCE/QUALITY CONTROL PROTOCOLS .....</b>	<b>C-1</b>

## LIST OF TABLES

---

Table 1. Cost-Effectiveness Model Inputs and Sources .....	5
Table 2. AEP TCC PY2020 Claimed and Evaluated Demand Savings.....	8
Table 3. AEP TCC PY2020 Claimed and Evaluated Energy Savings.....	9
Table 4. AEP TCC Cost-Effectiveness Results .....	10
Table 5. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF Filing) .....	11
Table 6. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs).....	16
Table 7. PY2020 Claimed Savings (Low Evaluation Priority Programs) .....	17
Table 8. AEP TNC PY2020 Claimed and Evaluated Demand Savings.....	18
Table 9. AEP TNC PY2020 Claimed and Evaluated Energy Savings.....	19
Table 10. AEP TNC Cost-Effectiveness Results .....	20
Table 11. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF Filing) .....	20
Table 12. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs).....	25
Table 13. PY2020 Claimed Savings (Low Evaluation Priority Programs) .....	26
Table 14. CenterPoint PY2020 Claimed and Evaluated Demand Savings .....	27
Table 15. CenterPoint PY2020 Claimed and Evaluated Energy Savings.....	28
Table 16. CenterPoint Cost-Effectiveness Results .....	29
Table 17. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF Filing) .....	30
Table 18. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs).....	37
Table 19. PY2020 Claimed Savings (Low Evaluation Priority Programs) .....	37
Table 20. El Paso Electric PY2020 Claimed and Evaluated Demand Savings .....	38

Table 21. El Paso Electric PY2020 Claimed and Evaluated Energy Savings .....	39
Table 22. El Paso Electric Cost-Effectiveness Results .....	40
Table 23. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF Filing) .....	40
Table 24. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs).....	45
Table 25. Entergy PY2020 Claimed and Evaluated Demand Savings .....	46
Table 26. Entergy PY2020 Claimed and Evaluated Energy Savings .....	47
Table 27. Entergy Cost-Effectiveness Results.....	48
Table 28. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF Filing) .....	48
Table 29. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs).....	52
Table 30. Oncor PY2020 Claimed and Evaluated Demand Savings .....	53
Table 31. Oncor PY2020 Claimed and Evaluated Energy Savings.....	54
Table 32. Oncor Cost-Effectiveness Results .....	55
Table 33. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF Filing) .....	55
Table 34. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs).....	62
Table 35. PY2020 Claimed Savings (Low Evaluation Priority Programs) .....	62
Table 36. SWEPCO PY2020 Claimed and Evaluated Demand Savings .....	63
Table 37. SWEPCO PY2020 Claimed and Evaluated Energy Savings .....	64
Table 38. SWEPCO Cost-Effectiveness Results .....	65
Table 39. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF Filing) .....	65
Table 40. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs).....	70
Table 41. TNMP PY2020 Claimed and Evaluated Demand Savings .....	71
Table 42. TNMP PY2020 Claimed and Evaluated Energy Savings .....	72
Table 43. TNMP Cost-Effectiveness Results.....	73
Table 44. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF Filing) .....	73
Table 45. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs).....	77
Table 46. PY2020 Claimed Savings (Low Evaluation Priority Programs) .....	78
Table 47. Xcel SPS PY2020 Claimed and Evaluated Demand Savings .....	79



Table 48. Xcel SPS PY2020 Claimed and Evaluated Energy Savings .....	80
Table 49. Xcel SPS Cost-Effectiveness Results.....	81
Table 50. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF Filing) .....	82
Table 51. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs).....	87
Table 52. Average Energy Cost by Utility .....	B-2
Table 53. Net-to-Gross Ratios.....	B-3

## LIST OF FIGURES

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Figure 1. Realization Rate Flowchart .....	4
Figure 2. Reporting Flowchart.....	7
Figure 3. Data Management Process.....	A-1

## GLOSSARY: ACRONYMS/ABBREVIATIONS/DEFINITIONS

Acronym	Description
AC	Air conditioner
AEP TCC	American Electric Power Texas Central Division
AEP TNC	American Electric Power Texas North Division
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
EUMMOT	Electric Utility Marketing Managers of Texas
GSHP	Ground-source heat pump
HCIF	Heating/cooling interactive factor
HOU	Hours of use
HPwES	Home Performance with ENERGY STAR®
HTR	Hard-to-reach

Acronym	Description
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
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
SWEPCO	Southwestern Electric Power Company
TMY	Typical meteorological year
TEESI	Texas Energy Engineering Services, Inc.
TNMP	Texas-New Mexico Power Company
TRM	Technical reference manual
WACC	Weighted average cost of capital
Xcel Energy SPS	Southwestern Public Service Company (Subsidiary of Xcel Energy)

## 1.0 INTRODUCTION

This document presents the utility impact evaluation results from the third-party evaluation, measurement, and verification (EM&V) results for energy efficiency portfolios implemented in program year (PY) 2020. It is a companion document to Volume 1 of the Statewide Energy Efficiency Portfolio Report. A summary report, *2020 Energy Efficiency Accomplishments*, is also available at [www.puc.texas.gov](http://www.puc.texas.gov).

PY2020 is the ninth program year evaluated as part of the statewide EM&V effort. The PY2020 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 PY2020 EM&V plans<sup>1</sup> are based on the prioritization for the EM&V effort. To briefly summarize, the EM&V team identified program types across utilities that have similar program design, delivery, and target markets. We reviewed each program type and prioritized (*high, medium, low*) based on the following considerations:

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

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

## 1.1 REPORT ORGANIZATION

Section 1.2 summarizes the evaluation approach; Sections 2.0 through 10.0 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 PY2020 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 PY2020 program data was requested from utilities and integrated into the database. A visual representation of the EM&V database import, review, and validation process can be found in Appendix A.

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

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

Next, the impact evaluation approach is summarized.

### 1.2.1 Implementing Impact Evaluations

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

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

Demand-side management (DSM) program evaluations routinely employ 90 percent confidence intervals with  $\pm 10$  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 are consistent with those listed in the tracking system. Second, the desk reviews verified that the savings estimates in the tracking system are consistent with the savings calculated in the deemed calculation tools, tables, or M&V methods used to estimate project savings.

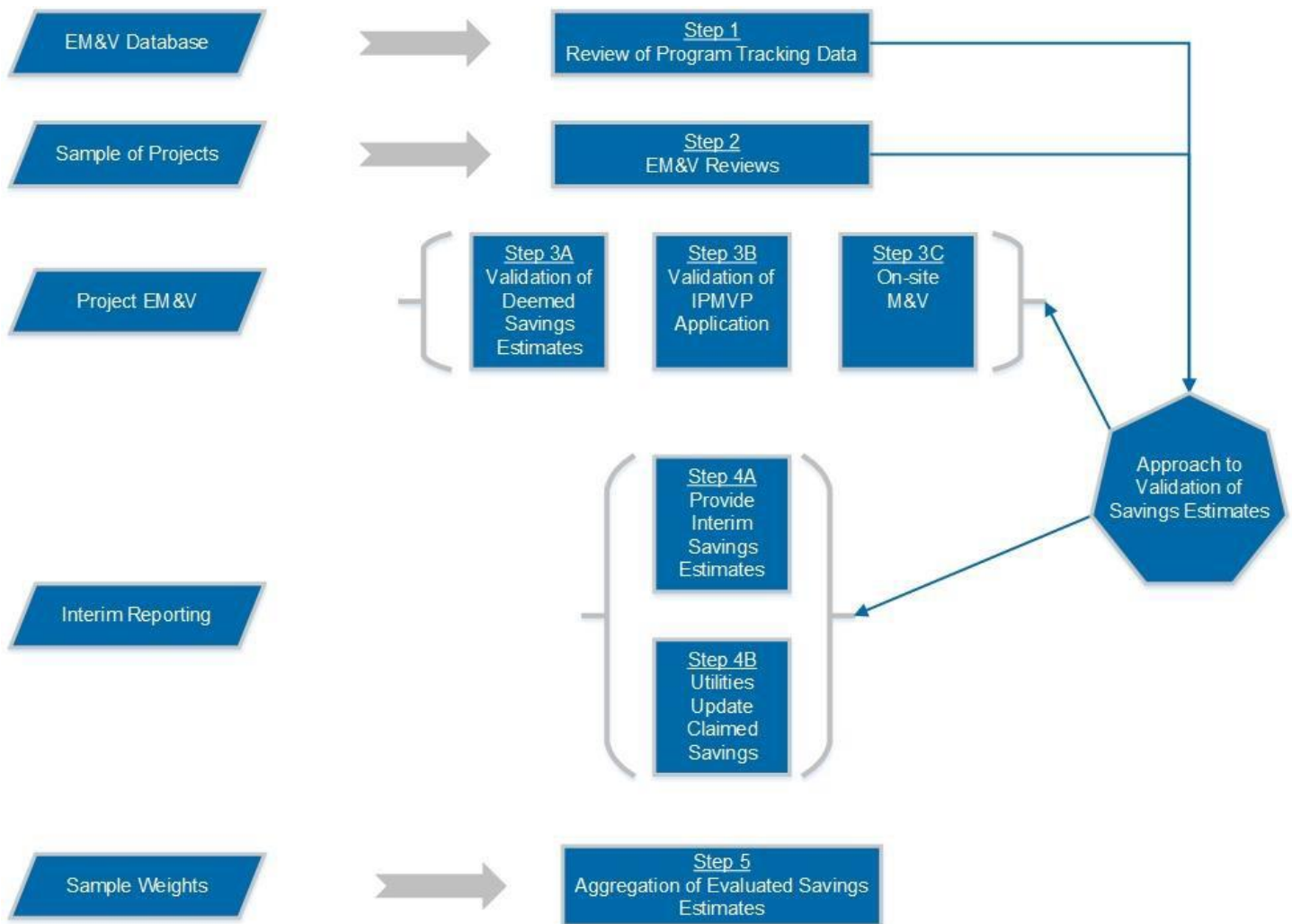
The desk reviews included a review of the assumptions used for the savings assumptions and, when available, utility M&V reports gathered through the supplemental data request for sampled projects.

### 1.2.1.2 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 PY2020 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 <sup>2</sup>	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 <sup>3</sup> utilities only)	Utility	Utilities
Realization rates	Program	Evaluation results

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

<sup>3</sup> Electric Reliability Council of Texas.

The EM&V team conducted PY2020 cost-effectiveness tests separately using claimed gross savings and evaluated gross savings. The model produces results at the portfolio, program category<sup>4</sup>, 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.

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 PY2020, the metrics to be used as the basis for recommendations in the reports are the program's gross savings realization rate and associated program documentation score, tracking system and interval meter data reviews, desk reviews, on-site M&V findings including site-specific realization rates, and programs' cost-effectiveness.

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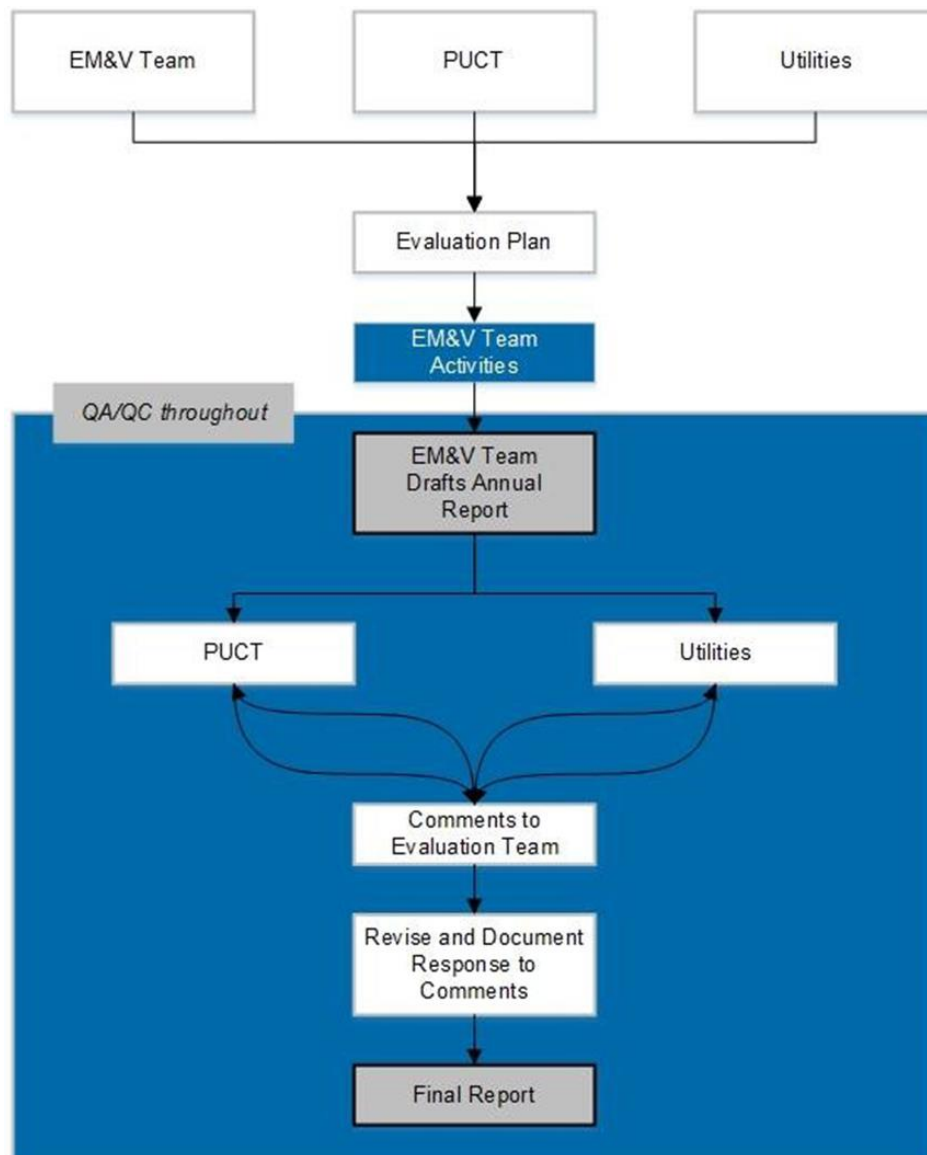
<sup>4</sup> Program categories are currently defined as nonresidential, residential, low-income, load management, and pilot.

The EM&V database is at the core of reporting results; it houses the claimed and evaluated savings. The database allows structured queries to provide results by utilities, program categories and types, measure types, or sectors. QA and QC are conducted to ensure that results 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 CENTRAL COMPANY IMPACT EVALUATION RESULTS

This section presents the evaluated savings and cost-effectiveness results for American Electric Power Texas Central Company's (AEP TCC) energy efficiency portfolio. The key findings are summarized first, followed by details for each program in the portfolio that had a *high* or *medium* evaluation priority. Finally, a list of the *low* evaluation 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 TCC's evaluated savings for program year (PY) 2020 were 50,420 in demand (kilowatt, kW) and 59,264,533 in energy (kilowatt-hour, kWh) savings. The overall kilowatt and kilowatt-hour portfolio realization rates are approximately 100 percent. AEP TCC was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (see Table 5), supporting healthy realization rates.

Table 2 shows the claimed and evaluated demand savings for AEP TCC'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 TCC PY2020 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
<b>Total portfolio</b>	100.0%	50,420	50,420	100.0%	0.3%
Commercial	19.0%	9,588	9,588	100.0%	2.1%
Residential	24.3%	12,262	12,262	100.0%	0.1%
Low-income	1.6%	829	829	100.0%	N/A
Load management*	55.0%	27,720	27,720	100.0%	N/A
Pilot	0.0%	22	22	100.0%	N/A

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

Table 3 shows the claimed and evaluated energy savings for AEP TCC's portfolio and broad customer sector and program categories for PY2020.

**Table 3. AEP TCC 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>59,264,533</b>	<b>59,264,533</b>	<b>100.0%</b>	<b>0.2%</b>
Commercial	57.9%	34,314,755	34,314,755	100.0%	0.3%
Residential	39.5%	23,438,226	23,438,226	100.0%	0.2%
Low-income	2.2%	1,321,255	1,321,255	100.0%	N/A
Load management*	0.0%	27,720	27,720	100.0%	N/A
Pilot	0.3%	162,577	162,577	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 TCC received *good* documentation scores for all evaluated programs, except the Smart Source Solar PV Market Transportation Program (MTP), which received a *fair* documentation score.

## 2.1.2 Cost-Effectiveness Results

AEP TCC's overall portfolio had a cost-effectiveness score of 3.3, or 3.6 excluding low-income programs.

The more cost-effective programs were the Commercial Solutions MTP and the Commercial Standard Offer Program (SOP); the less cost-effective programs were the Targeted Low-Income Energy Efficiency Program and the Residential Pool Pump Pilot MTP. All of AEP TCC's programs were cost-effective in 2020.

The lifetime cost of evaluated savings was \$0.020 per kWh and \$14.33 per kW.



**Table 4. AEP TCC Cost-Effectiveness Results**

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
<b>Total portfolio</b>	<b>3.32</b>	<b>3.32</b>	<b>2.97</b>
<b>Total portfolio excluding low-income programs</b>	<b>3.63</b>	<b>3.63</b>	<b>3.24</b>
<b>Commercial</b>	<b>4.79</b>	<b>4.79</b>	<b>4.30</b>
Commercial Solutions MTP	6.01	6.01	5.27
Commercial SOP	5.69	5.69	5.17
CoolSaver A/C Tune-Up MTP	3.77	3.77	3.02
Open MTP	3.09	3.09	2.94
SCORE/CitySmart MTP	4.74	4.74	4.18
SMART Source Solar PV MTP	4.76	4.76	4.80
<b>Residential</b>	<b>3.02</b>	<b>3.02</b>	<b>2.65</b>
CoolSaver A/C Tune-Up MTP	3.14	3.14	3.01
High-Performance New Homes MTP	2.74	2.74	2.19
Residential SOP	3.27	3.27	2.29
SMART Source Solar PV MTP	3.16	3.16	2.85
Hard-to-Reach SOP	2.65	2.65	2.65
<b>Low-income*</b>	<b>1.36</b>	<b>1.36</b>	<b>1.36</b>
Targeted Low-Income Energy Efficiency Program*	1.36	1.36	1.36
<b>Load management</b>	<b>1.65</b>	<b>1.65</b>	<b>1.65</b>
Load Management SOP	1.65	1.65	1.65
<b>Pilot</b>	<b>1.15</b>	<b>1.15</b>	<b>0.96</b>
Residential Pool Pump Pilot MTP	1.15	1.15	0.96

\* 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 TCC's June 1 filing.

**Table 5. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF<sup>5</sup> Filing)**

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial SOP	2.20	7,340.00
SCORE/CitySmart MTP	-29.90	0.00
SMART Source Solar PV MTP (commercial)	-0.20	-1,354.00
<b>Total</b>	<b>-27.90</b>	<b>5,986.00</b>

## 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
2.0%	1,008	1,008	100.0%	7.4%	4,400,927	4,400,927	100.0%	Good

Completed desk reviews*
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 PY2020 Commercial Solutions MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team did not adjust the claimed savings for any projects reviewed. Therefore, the final program realization rates are 100 percent for kilowatt and kilowatt-hour.

#### 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 both 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. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

<sup>5</sup> Energy efficiency cost recovery factor

### 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
5.1%	2,570	2,570	100.0%	21.3%	12,638,393	12,638,393	100.0%	Good

Completed desk reviews*
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 PY2020 Commercial SOP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for both projects. The two projects had adjustments of less than five percent compared to the originally claimed savings. AEP TCC accepted the evaluated results and matched the claimed savings to those of the evaluations for 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 1299568:** The energy efficiency project included interior and exterior LED lighting retrofits of a K–12 school with a partial summer session. During the desk review, the EM&V team adjusted several installed fixture wattages based on the DesignLights Consortium (DLC) QPL for the installed equipment. One LED tube-lamp wattage was adjusted from 16.0 W to 13.0 W, and the wattage of another lamp type was adjusted from 42.0 W to 16.0 W. The baseline fixture for one replacement was corrected from a four-foot-long fixture to a two-foot-long fixture. Overall, the adjustments resulted in a slight increase in the energy and peak demand savings, and realization rates for kilowatt and kilowatt-hour were rounded to 101 percent.

**Participant ID 1299488:** The energy efficiency project included interior LED lighting retrofits at a stand-alone retail building. During the desk review, the EM&V team adjusted several installed fixture wattages based on the DLC and ENERGY STAR® QPL. An LED fixture wattage was adjusted from 90.0 W to 83.0 W based on the DLC certificates. Two LED screw-in lamp wattages were adjusted and rounded to the nearest half-watt. One lamp was adjusted from 9.0 W to 9.5 W. A second lamp was adjusted from 35.0 W to 34.5 W. Overall, the corrections resulted in a slight increase in the energy and peak demand savings and realization rates for kilowatt and kilowatt-hour were rounded to 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
3.6%	1,839	1,839	100.0%	11.1%	6,605,627	6,605,627	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 PY2020 SCORE/CitySmart MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program 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. AEP TCC accepted the evaluated results and matched the claimed savings to those of the evaluations for the projects with significant adjustments. Therefore, the final program realization rate is 100 percent for kilowatt and kilowatt-hour. Further details of the EM&V findings are provided below.

**Participant ID 1311553:** The energy efficiency project at educational facilities included improved controls, Wi-Fi thermostats, and retro-commissioning of the HVAC system. The participant is claiming energy savings using the International Performance Measurement and Verification Protocols (IPMVP). This protocol requires 12 months of post-install data fully collected at the time of the claimed savings. Therefore, the project claimed 40 percent of the expected energy savings based on estimated calculations. The submitted calculation used an average peak demand comparison. The EM&V team adjusted the peak demand to match the *PDPF Top 20 Hours* method in Technical Reference Manual (TRM) Volume 1. The adjustment significantly impacted the peak kilowatt estimated energy savings. The corrections resulted in a decrease in estimated demand reduction and the initial claimed savings realization rate of 74 percent for kilowatt and 100 percent for kilowatt-hour.

**Participant ID 1311852:** The energy efficiency project included improved controls and retro-commissioning the HVAC system at an elementary school. The participant is claiming energy savings using IPMVP protocols, which require 12 months of post-install data at the time of the claimed savings. The submitted calculation used an average peak demand comparison. The EM&V team adjusted the peak demand to match the *PDPF Top 20 Hours* method in TRM Volume 1. The correction significantly impacted the peak kilowatt energy savings identified in the energy consumption analysis. The adjustments resulted in a decrease in estimated demand reduction and the initial claimed savings realization rate of 91 percent for kilowatt and 100 percent for kilowatt-hour.

### 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*.

## 2.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

### 2.4.1 Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
55.0%	27,720	27,720	100.0%	0.0%	27,720	27,720	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 Commercial Load Management SOP by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments at the electric service identifier ID (ESIID) level. Load management events in PY2020 occurred on the following dates and times:

- June 16, 2020, from 3:00 p.m. to 4:00 p.m. (scheduled); and
- August 14, 2020, from 1:00 p.m. to 2:00 p.m. (scheduled).

The EM&V team received interval meter data and a spreadsheet summarizing the event-level savings for the seven sponsors across 82 sites. Fifty-nine sites participated in the first scheduled event, and 14 sites participated in the second scheduled event. Nine sites did not have any load data associated with them as they did not participate in any event.

Since no unscheduled events were called in PY2020, AEP TCC calculated kilowatt savings for each site by applying the kilowatt reduction during the scheduled or test event (each site participates in only one test event). To calculate kilowatt-hour savings, AEP TCC summed kilowatt reductions of both scheduled events and multiplied them by the total number of event hours. Applying this method to the meter-level data and following the TRM, the EM&V team calculated kilowatt and kilowatt-hour savings that matched AEP TCC's. The table above shows both the EM&V team (evaluated) and AEP TCC's (claimed) calculated kilowatt and kilowatt-hour savings.

Evaluated savings for the Load Management SOP are 27,720 kW and 27,720 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

## 2.5 SUMMARY OF CROSS-SECTOR EVALUATED PROGRAMS

### 2.5.1 Smart Source Solar PV Market Transformation Program (MTP)

Sector	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
Residential	0.4%	190	190	100.0%	1.1%	647,166	647,166	100.0%	Fair
Commercial	0.6%	299	299	100.0%	1.7%	1,023,942	1,023,942	100.0%	Fair

Completed desk reviews*
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 PY2020 Smart Source Solar PV MTP evaluation efforts focused on desk reviews. The sample of completed desk review projects for this program is listed above.



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

**Participant ID 1376008:** The project included a large roof-mounted solar array at a new construction religious facility. During the desk review, the EM&V team found that the submitted calculator did not match the installed system. The EM&V team adjusted the azimuth and quantity of panels based on post-install documentation and found that the calculated energy savings likely exceeded the claimed energy savings. Although documentation could not confirm all aspects of the installed solar PV system, the EM&V team did not adjust the energy savings; the realization rates are 100 percent for kilowatt and kilowatt-hour.

**Participant ID 1305485:** The project included a roof-mounted solar array at a single-family residence. During the desk review, the EM&V team adjusted the azimuth in the calculator to match the actual install direction from a rounded value and increased the size of the panel from 310.0 W to 315.0 W based on the documentation submitted. Overall, the adjustments decreased peak demand and electricity savings. The realization rates are 98 percent for kilowatt and 94 percent for kilowatt-hour.

### Documentation Score

The EM&V team partially verified key inputs and assumptions (e.g., equipment quantity, equipment size, azimuth, tilt) for two projects that had desk reviews completed. Submitted photos confirmed panel manufacturer, model, and standard test conditions rating. The tilt and azimuth were documented in the pre-install documents but not verified in the post-install inspection notes or other documentation. The project documentation did not include invoices, although a completed final project energy calculation sheet was provided. 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*.

## 2.6 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 6 summarizes claimed savings for AEP TCC’s programs in PY2020 that only received a tracking system review for program impacts. The programs’ claimed savings were verified against the final PY2020 tracking data provided to the EM&V team for the EM&V database.

**Table 6. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs)**

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Residential SOP	12.4%	6,273	6,273	100.0%	18.7%	11,083,793	11,083,793	100.0%
Hard-to-Reach SOP	4.7%	2,352	2,352	100.0%	6.6%	3,918,443	3,918,443	100.0%

## 2.7 SUMMARY OF LOW EVALUATION PRIORITY PROGRAMS

Table 7 summarizes claimed savings for AEP TCC's low evaluation priority programs in PY2020, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2020 tracking data provided to the EM&V team for the EM&V database.

**Table 7. PY2020 Claimed Savings (Low Evaluation Priority Programs)**

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Residential Pool Pump MTP	0.0%	22	22	100.0%	0.3%	162,577	162,577	100.0%
Targeted Low-Income Energy Efficiency Program	1.6%	829	829	100.0%	2.2%	1,321,255	1,321,255	100.0%
CoolSaver A/C Tune-Up MTP (residential)	3.0%	1,511	1,511	100.0%	8.6%	5,082,376	5,082,376	100.0%
CoolSaver A/C Tune-Up MTP (commercial)	6.0%	3,025	3,025	100.0%	10.2%	6,017,714	6,017,714	100.0%
High-Performance New Homes MTP	3.8%	1,936	1,936	100.0%	4.6%	2,706,448	2,706,448	100.0%
Open MTP	1.7%	848	848	100.0%	6.1%	3,628,153	3,628,153	100.0%

## 3.0 AMERICAN ELECTRIC POWER TEXAS NORTH COMPANY IMPACT EVALUATION RESULTS

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

AEP TNC's evaluated savings for program year (PY) 2020 were 5,807 in demand (kilowatt, kW) and 12,793,802 in energy (kilowatt-hour, kWh) savings. The overall kilowatt and kilowatt-hour portfolio realization rates are approximately 100 percent. AEP TNC was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (see Table 11), supporting healthy realization rates.

Table 8 shows the claimed and evaluated demand savings for AEP TNC's portfolio and broad customer sector and program categories. Load management results are based on census reviews, and therefore precisions calculations are non-applicable (N/A).

**Table 8. AEP TNC PY2020 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>5,804</b>	<b>5,807</b>	<b>100.0%</b>	<b>1.5%</b>
Commercial	35.8%	2,075	2,075	100.0%	4.7%
Residential	28.5%	1,654	1,657	100.2%	0.6%
Low-income	2.5%	143	143	100.0%	N/A
Load management*	33.3%	1,931	1,931	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 9 shows the claimed and evaluated energy savings for AEP TNC's portfolio and broad customer sector and program categories for PY2020.

**Table 9. AEP TNC 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>12,785,271</b>	<b>12,793,802</b>	<b>100.1%</b>	<b>10.4%</b>
Commercial	72.3%	9,241,890	9,241,890	100.0%	15.3%
Residential	25.5%	3,258,042	3,266,573	100.3%	0.8%
Low-income	2.2%	283,408	283,408	100.0%	N/A
Load management*	0.0%	1,931	1,931	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 TNC received *good* documentation scores for all evaluated programs, except its Smart Source Solar PV MTP, which received a *fair* documentation score.

### 3.1.2 Cost-Effectiveness Results

AEP TNC's overall portfolio had a cost-effectiveness score of 3.3, or 3.7 excluding low-income programs.

The more cost-effective programs were the Commercial Standard Offer Program (SOP) and the SCORE/CitySmart Market Transformation Program (MTP). The less cost-effective programs were the Targeted Low-Income Energy Efficiency Program and the Load Management SOP. All of AEP TNC's programs were cost-effective in 2020.

The lifetime cost of evaluated savings was \$0.019 per kilowatt-hour and \$12.79 per kilowatt.

**Table 10. AEP TNC Cost-Effectiveness Results**

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
<b>Total portfolio</b>	<b>3.32</b>	<b>3.32</b>	<b>3.05</b>
<b>Total portfolio excluding low-income programs</b>	<b>3.67</b>	<b>3.67</b>	<b>3.37</b>
<b>Commercial</b>	<b>4.35</b>	<b>4.35</b>	<b>3.92</b>
Commercial Solutions MTP	4.71	4.71	4.14
Commercial SOP	5.32	5.32	4.83
Open MTP	2.36	2.36	2.24
SCORE/CitySmart MTP	6.35	6.35	5.57
SMART Source Solar PV MTP	3.58	3.58	3.61
<b>Residential</b>	<b>2.94</b>	<b>2.95</b>	<b>2.77</b>
Residential SOP	3.30	3.30	3.16
SMART Source Solar PV MTP	3.16	3.18	2.87
Hard-to-Reach SOP	2.54	2.54	2.54
<b>Low-income*</b>	<b>1.23</b>	<b>1.23</b>	<b>1.23</b>
Targeted Low-Income Energy Efficiency Program*	1.23	1.23	1.23
<b>Load management</b>	<b>1.17</b>	<b>1.17</b>	<b>1.17</b>
Load Management SOP	1.17	1.17	1.17

\* 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 11 summarizes claimed savings adjustments recommended by the EM&V team. Realization rates assume the following adjustments will be included in AEP TNC's June 1 filing.

**Table 11. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF<sup>6</sup> Filing)**

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial Solutions MTP	-0.70	-12,227.00
Commercial SOP	-0.30	-908.00
SMART Source Solar PV MTP	9.90	22,182.00
Residential SOP	2.60	8,491.60
<b>Total</b>	<b>11.50</b>	<b>17,538.60</b>

<sup>6</sup> Energy efficiency cost recovery factor

### 3.3 DETAILED FINDINGS—COMMERCIAL

#### 3.3.1 Commercial Solutions Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
10.3%	598	598	100.0%	21.6%	2,759,079	2,759,079	100.0%	Good

Completed desk reviews*
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 PY2020 Commercial Solutions MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews is listed above.

The EM&V team adjusted the claimed savings for one project. The project had adjustments of greater than five percent compared to the originally claimed savings. AEP TNC accepted the evaluated results and matched the claimed savings to those of the evaluation; 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 1312379:** The energy efficiency project included an interior LED lighting retrofit of an office facility. During the desk review, the EM&V team adjusted the installed model of one LED tube lamp based on the documentation, which adjusted the associated lighting wattages for the lamp from 13.0 W to 17.0 W. In addition, the EM&V team corrected the building type from *mercantile: 24 hour stand-alone retail* to *office* because the prevalent building use is office. Overall, the adjustments resulted in decreased energy and peak demand savings and realization rates of 76 percent for kilowatt and 42 percent for kilowatt-hour.

#### 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; Air Conditioning, Heating, and Refrigeration Institute (AHRI) certifications) for one of the two projects that had desk reviews completed because sufficient documentation was provided for the sites. The other project required the EM&V team to seek documentation of the building type. Both projects were regular lighting projects. Documentation submitted included invoices, QPL qualifications, equipment specifications, 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*.



### 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
10.4%	606	606	100.0%	20.3%	2,594,781	2,594,781	100.0%	Good

Completed desk reviews*
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 PY2020 Commercial SOP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

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 TNC accepted the evaluated results and matched the claimed savings to those of the evaluations. 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 1307101:** The energy efficiency project included an interior LED lighting retrofit of an airplane hangar. During the desk review, the EM&V team adjusted the installed model of several LED tube lamps and fixtures based on the DesignLights Consortium (DLC) QPL. The EM&V team corrected wattage for one LED tube lamp from 24.0 W to 23.5 W, another LED tube lamp from 10.0 W to 16.5 W, and an LED fixture from 200.0 W to 209.0 W. Overall, the adjustments resulted in a decrease in the energy and peak demand savings, and realization rates of 98 percent for kilowatt and kilowatt-hour.

#### 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*.

### 3.3.3 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
7.7%	449	449	100.0%	16.6%	2,120,000	2,120,000	100.0%	Good

Completed desk reviews*
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 PY2020 SCORE/CitySmart MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team did not adjust the claimed savings for any projects reviewed. Therefore, the final program realization rates are 100 percent for kilowatt and kilowatt-hour.

#### Documentation Score

The EM&V team was able to verify 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. 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. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

## 3.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

### 3.4.1 Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
33.3%	1,931	1,931	100.0%	0.0%	1,931	1,931	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 technical reference manual (TRM) calculation methodology to interval meter data. The meter data was supplied in 15-minute increments at the electric service identifier ID (ESIID) level. A single load management event occurred in PY2020 on June 17, 2020, from 4:00 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 four sponsors across 21 sites. Eighteen sites participated in the scheduled event, and the remaining three sites did not have any load data associated with them as they did not participate in the event.

Since no unscheduled events were called in PY2020, AEP TNC calculated kilowatt savings for each site by applying the kilowatt reductions during the scheduled or test event. To calculate kilowatt-hour savings, AEP TNC summed kilowatt reductions of the scheduled event and multiplied them by the total number of event hours. Applying this method to the meter-level data and following the TRM, the EM&V team calculated kilowatt and kilowatt-hour savings that matched AEP TNC's. The table above shows both the EM&V team (evaluated) and AEP TNC's (claimed) calculated kilowatt and kilowatt-hour savings.

The evaluated savings for the Load Management SOP are 1,931 kW and 1,931 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

### 3.5 SUMMARY OF CROSS-SECTOR EVALUATED PROGRAMS

#### 3.5.1 Smart Source Solar PV Market Transformation Program (MTP)

Sector	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
Residential	1.9%	108	108	100.0%	2.7%	348,748	348,748	100.0%	Fair
Commercial	1.1%	64	64	100.0%	1.6%	199,942	199,942	100.0%	Fair

Completed desk reviews*
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 PY2020 Smart Source Solar PV MTP evaluation efforts focused on desk reviews. The sample of completed desk review projects for this program is listed above.

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

**Participant ID 1376026:** The project included installing a large roof-mounted solar array at an electric co-op office. During the desk review, the EM&V team found that the documentation did not match the tracked energy values. The EM&V team adjusted the savings to match the documentation, increasing peak demand savings and decreasing electricity savings. The realization rates are 127 percent for kilowatt and 98 percent for kilowatt-hour.

**Participant ID 1307672:** The project included installing a roof-mounted solar array at a single-family residence. During the desk review, the EM&V team found that the documentation did not match the tracked energy values. The EM&V team adjusted the savings to match the documentation, increasing peak demand and electricity savings. The realization rates are 118 percent for kilowatt and 114 percent for kilowatt-hour.

### Documentation Score

The EM&V team partially verified key inputs and assumptions (e.g., equipment quantity, equipment size, azimuth, tilt) for two projects that had desk reviews completed. Submitted photos confirmed panel manufacturer, model, and standard test conditions rating. The tilt and azimuth were documented in the pre-install documents but not verified in the post-install inspection notes or other documentation. The project documentation did not include invoices, although a completed final project energy calculation sheet was provided. Complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. Overall, the EM&V team assigned a program documentation score of *fair*.

## 3.6 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 12 summarizes claimed savings for AEP TNC’s programs in PY2020 that only received a tracking system review for program impacts. The programs’ claimed savings were verified against the final PY2020 tracking data provided to the EM&V team for the EM&V database.

Overall, evaluated programs achieved 100 percent realization rates for energy and demand. However, the EM&V team found a data entry error in the one ground-source heat pump project implemented, resulting in low savings. The EM&V team worked with the implementor to verify tracked data and calculated savings using the actual equipment inputs resulting in substantially increased savings for this measure. The EM&V team adjusted the savings accordingly.

**Table 12. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs)**

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Residential SOP	16.8%	972	975	100.3%	14.4%	1,841,371	1,849,902	100.5%
Hard-to-Reach SOP	9.9%	574	574	100.0%	8.4%	1,067,923	1,067,923	100.0%

### 3.7 SUMMARY OF LOW EVALUATION PRIORITY PROGRAMS

Table 13 summarizes claimed savings for AEP TNC’s low evaluation priority programs in PY2020, including programs’ overall contribution to portfolio savings. Low priority programs’ claimed savings were verified against the final PY2020 tracking data provided to the EM&V team for the EM&V database.

**Table 13. PY2020 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)
Open MTP	6.2%	359	359	100.0%	12.3%	1,568,088	1,568,088	100.0%
Targeted Low-Income Energy Efficiency Program	2.5%	143	143	100.0%	2.2%	283,408	283,408	100.0%

## 4.0 CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC IMPACT EVALUATION RESULTS

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

CenterPoint's evaluated savings for program year (PY) 2020 were 171,422 in demand (kilowatt, kW) and 194,031,305 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 17), supporting healthy realization rates.

Table 14 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 precisions calculations are not applicable (N/A).

**Table 14. CenterPoint PY2020 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>171,424</b>	<b>171,424</b>	<b>100.0%</b>	<b>0.9%</b>
Commercial	11.4%	19,539	19,539	100.0%	7.4%
Residential	15.8%	27,053	27,052	100.0%	N/A
Low-income	2.8%	4,787	4,787	100.0%	N/A
Load management*	70.0%	120,043	120,043	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 15 shows the claimed and evaluated energy savings for CenterPoint’s portfolio and broad customer sector and program categories for PY2020.

**Table 15. CenterPoint 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>194,032,394</b>	<b>194,031,305</b>	<b>100.0%</b>	<b>4.2%</b>
Commercial	46.7%	90,701,258	90,701,258	100.0%	9.1%
Residential	48.9%	77,863,862	77,863,862	100.0%	0.0%
Low-income	4.0%	7,726,352	7,726,352	100.0%	N/A
Load management*	0.4%	720,260	720,260	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. CenterPoint received a *good* documentation score for all evaluated programs in PY2020.

#### 4.1.2 Cost-Effectiveness Results

CenterPoint’s overall portfolio had a cost-effectiveness score of 3.6, or 3.9 excluding low-income programs.

The more cost-effective programs were Advanced Lighting (both commercial and residential) and Smart Thermostat; the less cost-effective programs were Commercial Load Management and Residential Demand Response. All of CenterPoint’s programs were cost-effective in 2020.

The lifetime cost of evaluated savings was \$0.017 per kilowatt-hour and \$12.91 per kilowatt.



**Table 16. CenterPoint Cost-Effectiveness Results**

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
<b>Total portfolio</b>	<b>3.64</b>	<b>3.64</b>	<b>2.95</b>
<b>Total portfolio excluding low-income programs</b>	<b>3.90</b>	<b>3.90</b>	<b>3.12</b>
<b>Commercial</b>	<b>3.99</b>	<b>3.99</b>	<b>3.56</b>
Commercial Standard Offer Program (SOP)	4.99	4.99	4.53
Commercial Market Transformation Program (MTP) (SCORE, Healthcare, Data Center)	3.16	3.16	2.77
Retro-Commissioning MTP	2.04	2.04	1.83
Retail Electric Provider (REP) (Commercial CoolSaver)	2.01	2.01	1.61
Advanced Lighting Commercial	13.86	13.86	6.93
<b>Residential</b>	<b>4.86</b>	<b>4.86</b>	<b>3.39</b>
Residential and Small Commercial (SC) SOP	3.30	3.30	3.00
Smart Thermostat Program	6.20	6.20	5.21
Advanced Lighting Residential	13.39	13.39	6.69
Residential Pool Pump and AC Distributor MTP	2.67	2.67	2.13
REP (Residential CoolSaver & Efficiency Connection)	3.64	3.64	2.91
Multifamily Market Rate MTP	3.93	3.93	3.15
CenterPoint Energy High Efficiency Homes MTP	5.22	5.22	3.65
Hard-to-Reach (HTR) SOP	2.04	2.04	2.04
Multifamily MTP	2.52	2.52	2.52
<b>Low-income*</b>	<b>2.83</b>	<b>2.83</b>	<b>2.83</b>
Targeted Low-Income MTP (Agencies in Action)*	2.83	2.83	2.83
<b>Load management</b>	<b>1.21</b>	<b>1.21</b>	<b>1.21</b>
Large Commercial Load Management SOP	1.27	1.27	1.27
Residential Demand Response Program	1.00	1.00	1.00

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

## 4.2 CLAIMED SAVINGS ADJUSTMENTS

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 17 summarizes claimed savings adjustments recommended by the EM&V team. Realization rates assume the following adjustments will be included in CenterPoint’s June 1 filing. 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 17. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF<sup>7</sup> Filing)**

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial MTP (SCORE, Healthcare, Data Center)	-177.20	-1,306,592.00
Large Commercial Load Management SOP	0.00	343.00
Commercial SOP	-132.40	-30,984.00
<b>Total</b>	<b>-309.60</b>	<b>-1,337,233.00</b>

## 4.3 DETAILED FINDINGS—COMMERCIAL

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

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
3.7%	6,395	6,395	100.0%	15.0%	29,029,976	29,029,976	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 PY2020 Commercial MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

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

**Participant ID 1357761:** The energy efficiency project included interior and exterior lighting, lighting controls, and water-cooled chillers at a new construction elementary school. During the desk review, the EM&V team adjusted the building type in the HVAC calculations from *secondary school* to *primary school*. For the lighting portion of the project, the EM&V team corrected the wattage for several fixtures based on post-install

<sup>7</sup> Energy efficiency cost recovery factor

documentation and the DesignLights Consortium (DLC) Qualified Products List (QPL); fixtures were adjusted from 42.5 W to 40.0 W, 39.5 W to 39.0 W, and 25.0 W to 40.5 W. In addition, two fixtures were adjusted from an *other* qualification status to *non-qualified*, and one fixture was adjusted from *non-qualified* to *ENERGY STAR®-qualified*. The adjusted wattages and qualifications impacted the lighting controls, and the savings were adjusted accordingly. Overall, the adjustments decreased the energy and peak demand savings and resulted in realization rates of 93 percent kilowatt and 86 percent kilowatt-hour.

**Participant ID 1357767:** The energy efficiency project included an early replacement of two large, air-cooled chillers at an elementary school. During the desk review, the EM&V team adjusted the building type in the HVAC calculations from *primary school* to *elementary school*. Overall, the corrections decreased the energy and peak demand savings and resulted in realization rates of 63 percent kilowatt and 59 percent kilowatt-hour.

**Participant ID 1357778:** The energy efficiency project included interior and exterior LED retrofits with lighting controls and an early replacement of two air-cooled chillers at an elementary school. During the desk review, the EM&V team adjusted the building type in the HVAC calculations from *secondary school* to *primary school*. For the lighting portion of the project, the EM&V team adjusted the wattage for a single fixture type from 258.0 W to 320.0 W based on post-install documentation and the DLC-qualified product list. Additionally, one fixture was adjusted to *qualified* from a *non-qualified* status claimed because the EM&V team identified the certification in the ENERGY STAR listing. Overall, the adjustments resulted in a decrease in energy and peak demand savings and realization rates of 68 percent kilowatt and 63 percent kilowatt-hour.

**Participant ID 1357795:** The energy efficiency project included interior and exterior lighting, lighting controls, and air-cooled variable refrigerant flow heat pumps at a new construction college campus. During the desk review, the EM&V team adjusted the qualification for two fixtures to *non-qualified* from a *qualified* status claimed. Overall, the adjustments decreased the energy and peak demand savings and resulted in realization rates of 87 percent kilowatt and 83 percent kilowatt-hour.

**Participant ID 1357797:** The new construction project included energy-efficient interior and exterior lighting, lighting controls, and air-cooled variable refrigerant flow heat pumps at a college campus. During the desk review, the EM&V team adjusted the wattage for a single fixture type from 27.5 W to 26.0 W based on post-install documentation and the DLC-qualified product list. In addition, two fixtures were adjusted to *non-qualified* from a *qualified* status claimed. The adjusted wattages and qualifications impacted the lighting controls, and the savings were adjusted accordingly. Overall, the adjustments resulted in decreased energy and peak demand savings and realization rates of 81 percent kilowatt and 82 percent kilowatt-hour.

**Participant ID 1358712:** The custom energy efficiency project included retrofitting existing air handlers in a data center with energy-efficient fans. During the desk review, the EM&V team found that energy savings were claimed to turn off 11 units that were not retrofitted. This activity was not considered an energy-efficient component of the project, and the associated savings were removed. Overall, the adjustments decreased the energy and peak demand savings and resulted in realization rates of 30 percent kilowatt and 26 percent kilowatt-hour.

## 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 eight 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 Commercial Standard Offer Program (SOP)

Program contribution to Portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
6.5%	11,119	11,119	100.0%	27.2%	52,856,029	52,856,029	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 PY2020 Commercial SOP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

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

**Participant ID 1313666:** The energy efficiency project included interior and exterior lighting retrofits at a three-shift manufacturing facility. During the desk review, the EM&V team adjusted the wattage for a single fixture type from 12.0 W to 13.5 W based on post-install documentation and the DLC QPL. This correction resulted in a very slight decrease in energy and peak demand savings and realization rates of 100 percent kilowatt and kilowatt-hour.

**Participant ID 1313748:** The energy efficiency project included an interior lighting retrofit at a stand-alone retail facility. During the desk review, the EM&V team corrected the wattage for a single fixture type from 94.0 W to 94.5 W based on the DLC QPL. This adjustment resulted in a very slight decrease in energy and peak demand savings and realization rates of 100 percent kilowatt and kilowatt-hour.

**Participant ID 1313870:** The energy efficiency project included installing individual unit heat pumps at a master-metered multifamily property to replace a central HVAC system. During the desk review, the EM&V team adjusted the heat pump seasonal energy efficiency ratio rating from 15.5 to 16.0 for two buildings. This correction resulted in a very slight increase in energy and peak demand savings and realization rates of 100 percent kilowatt and kilowatt-hour.

### Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for nine projects that had desk reviews completed 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. Partial documentation was provided for one refrigeration project that lacked the documentation of the operating temperature of the refrigeration or freezer unit. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

### 4.3.3 Retro-Commissioning Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
0.7%	1,209	1,209	100.0%	3.3%	6,460,231	6,460,231	100.0%	Good

Completed desk reviews*
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 PY2020 Retro-Commissioning MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for all three projects. The three 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 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 1358754:** The project included the retro-commissioning of a high school HVAC system. During the desk review, the EM&V team adjusted the measures to eliminate the interactive effects of completing multiple improvements and corrected the peak demand period to the summer peak period for all adjustments. These corrections resulted in decreased energy and peak demand savings and realization rates of 84 percent kilowatt and 97 percent kilowatt-hour.

**Participant ID 1358759:** The project included the retro-commissioning of a multi-building office complex. During the desk review, the EM&V team adjusted the measures to eliminate the interactive effects of completing multiple improvements. This correction decreased the energy and peak demand savings and resulted in realization rates of 90 percent kilowatt and 93 percent kilowatt-hour.

**Participant ID 1313870:** The project included retro-commissioning a large office building that mainly houses communication equipment. During the desk review, the EM&V team adjusted the percentage that the exhaust fans are off during peak hours from 100 percent off to 40 percent off to ensure the calculation is conservative in the absence of measurement and verification (M&V) information. In addition, the chiller efficiencies were corrected to match the documented efficiencies. Overall, the adjustments decreased the peak demand savings and increased the energy savings and resulted in realization rates of 60 percent kilowatt and 102 percent kilowatt-hour.

### 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 three projects that had desk reviews. Project documentation included calculations, management system screenshots, implementer invoices, and the final report. Although the documentation organization was difficult to use, 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*.

## 4.4 DETAILED FINDINGS—RESIDENTIAL

### 4.4.1 Smart Thermostat 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
0.0%	0.0	0.0	N/A	2.6%	5,101,760	5,101,760	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 PY2020 Smart Thermostat program evaluation efforts focused on a documentation review. There were no savings adjustments made for this program.

## Documentation Score

Due to the nature of the midstream program delivery, documentation requirements differ from that of a standard offer program. Typical tracking and documentation for midstream programs can include but are not limited to monthly store invoices, aggregate customer data, quantity purchased, and model numbers of purchased measures. CenterPoint provided the program manual, aggregate customer data, customer coupon codes, quantity purchased, rebates paid, retailer invoice numbers, and thermostat models. The EM&V team determined that CenterPoint provided sufficient documentation for the Smart Thermostat program. Overall, the EM&V team assigned a program documentation score of *good*.

## 4.5 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

### 4.5.1 Large Commercial Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
58.0%	99,493	99,495	100.0%	0.3%	596,959	596,970	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 Large Commercial 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 electric service identifier ID (ESIID) level. Load management events in PY2020 occurred on the following dates and times:

- July 16, 2020, from 2:00 p.m. to 5:00 p.m. (scheduled); and
- August 20, 2020, 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 savings results for each scheduled or test event and each ESIID. The EM&V team calculated savings for each participating ESIID, with the results matching those of the program. As such, no adjustments were made to the program savings. The table above shows both the EM&V team (evaluated) and CenterPoint's (claimed) calculated kilowatt and kilowatt-hour savings. The minor differences are due to rounding practices.

Evaluated savings for the Large Commercial Load Management SOP are 99,495 kW and 596,970 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.



## 4.5.2 Residential Demand Response Program

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
12.0%	20,552	20,552	100.0%	0.1%	123,312	123,312	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 Residential Demand Response program by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments at the ESIID level. Load management events in PY2020 occurred on the following dates and times:

- July 16, 2020, from 2:00 p.m. to 5:00 p.m. (scheduled); and
- August 20, 2020, 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 savings results for each scheduled or test event and each ESIID. The EM&V team calculated savings for each participating ESIID, with the results matching those of the program. As such, no adjustments were made to the program savings. The table above shows both the EM&V team (evaluated) and CenterPoint's (claimed) calculated kilowatt and kilowatt-hour savings.

Evaluated savings for the Residential Demand Response program are 20,552 kW and 123,312 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

## 4.6 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 18 summarizes claimed savings for CenterPoint's programs in PY2020 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2020 tracking data provided to the EM&V team for the EM&V database.

Overall, evaluated programs achieved near 100 percent realization rates for energy and demand. However, the EM&V team found a discrepancy in calculations for one ceiling insulation project, resulting in slightly different evaluated savings from claimed savings. The EM&V team found that cooling savings were claimed for one project where the cooling type was tracked as *none*. The EM&V team adjusted the savings accordingly.

**Table 18. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs)**

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Residential and SC SOP	0.3%	480	480	100.0%	0.7%	1,286,822	1,286,822	100.0%
Hard-to-Reach SOP	0.5%	864	863	99.9%	0.5%	1,023,277	1,022,189	99.9%

## 4.7 SUMMARY OF LOW EVALUATION PRIORITY PROGRAMS

Table 19 summarizes claimed savings for CenterPoint's low evaluation priority programs in PY2020, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2020 tracking data provided to the EM&V team for the EM&V database.

**Table 19. PY2020 Claimed Savings (Low Evaluation Priority Programs)**

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Residential Pool Pump and A/C Distributor MTP	2.0%	3,471	3,471	100.0%	5.3%	10,201,776	10,201,776	100.0%
Advanced Lighting Residential	3.4%	5,827	5,827	100%	16.7%	32,497,186	32,497,186	100%
Advanced Lighting Commercial	0.2%	307	307	100%	0.9%	1,710,378	1,710,378	100%
Multifamily MTP (HTR)	0.3%	509	509	100%	0.9%	1,832,484	1,832,484	100%
Multifamily Market Rate MTP (residential)	2.2%	3,792	3,792	100%	3.6%	6,941,095	6,941,095	100%
Targeted Low-Income MTP (Agencies in Action)	2.8%	4,787	4,787	100%	4.0%	7,726,352	7,726,352	100%
REP (Residential CoolSaver and Efficiency Connection)	0.6%	1,089	1,089	100%	3.2%	6,129,949	6,129,949	100%
CenterPoint Energy High-Efficiency Homes MTP	6.4%	11,020	11,020	100%	15.4%	29,870,174	29,870,174	100%
REP (Commercial CoolSaver)	0.3%	509	509	100%	0.3%	644,644	644,644	100%

## 5.0 EL PASO ELECTRIC COMPANY IMPACT EVALUATION RESULTS

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

El Paso Electric's evaluated savings for program year (PY) 2020 were 20,740 in demand (kilowatt, kW) and 30,704,424 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 (Table 23), supporting healthy realization rates.

Table 20 shows the claimed and evaluated demand savings for El Paso Electric'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 20. El Paso Electric PY2020 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>20,740</b>	<b>20,740</b>	<b>100.0%</b>	<b>0.0%</b>
Commercial	26.8%	5,556	5,556	100.0%	0.0%
Residential	10.1%	2,101	2,101	100.0%	N/A
Load management*	59.6%	12,365	12,365	100.0%	N/A
Pilot	3.5%	718	718	100.0%	0.0%

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

Table 21 shows the claimed and evaluated energy savings for El Paso Electric’s portfolio and broad customer sector and program categories for PY2020.

**Table 21. El Paso Electric 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>30,704,424</b>	<b>30,704,424</b>	<b>100.0%</b>	<b>0.0%</b>
Commercial	75.5%	23,177,386	23,177,386	100.0%	0.0%
Residential	13.0%	3,997,899	3,997,899	100.0%	N/A
Load management*	3.0%	930,633	930,633	100.0%	N/A
Pilot	8.5%	2,598,506	2,598,506	100.0%	0.0%

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

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

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. El Paso Electric received a *good* program documentation score for all evaluated programs in PY2020.

### 5.1.2 Cost-Effectiveness Results

El Paso Electric’s overall portfolio had a cost-effectiveness score of 5.0.

The more cost-effective programs were the Commercial Marketplace Pilot MTP and the Large C&I Solutions MTP; the less cost-effective programs were the Commercial Load Management SOP and the Residential Demand Response MTP. The Residential Demand Response MTP did not pass cost-effectiveness.

The lifetime cost of evaluated savings was \$0.014 per kWh and \$9.82 per kW.

**Table 22. El Paso Electric Cost-Effectiveness Results**

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
<b>Total portfolio</b>	5.02	5.02	4.39
<b>Commercial</b>	<b>6.92</b>	<b>6.92</b>	<b>6.14</b>
Small Commercial Solutions MTP	4.87	4.87	4.63
Large C&I Solutions MTP	8.08	8.08	7.11
Texas SCORE MTP	5.79	5.79	5.08
<b>Residential</b>	<b>2.91</b>	<b>2.91</b>	<b>2.71</b>
Residential Solutions MTP	3.63	3.63	3.27
LivingWise MTP	3.52	3.52	2.82
Texas Appliance Recycling MTP	3.07	3.07	3.07
Hard-to-Reach Solutions MTP	2.34	2.34	2.34
<b>Load management</b>	<b>0.98</b>	<b>0.98</b>	<b>0.98</b>
Commercial Load Management SOP	1.25	1.25	1.25
Residential Load Management MTP	0.57	0.57	0.57
<b>Pilot</b>	<b>7.36</b>	<b>7.36</b>	<b>3.68</b>
Residential Marketplace Pilot MTP	6.58	6.58	3.29
Commercial Marketplace Pilot MTP	22.36	22.36	11.18

## 5.2 CLAIMED SAVINGS ADJUSTMENTS

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 23 summarizes claimed savings adjustments recommended by the EM&V team. All commercial adjustments were made prior to the Energy Efficiency Plan and Report filing on April 1, 2021. Realization rates assume the following adjustments will be included in El Paso Electric’s May 1 filing.

**Table 23. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF<sup>8</sup> Filing)**

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial Load Management SOP	1.0	0.00
Large C&I Solutions MTP	8.70	34,735.00
Residential Load Management MTP	-13.10	-209.00
Residential Solutions MTP	0.20	0.00
<b>Total</b>	<b>-3.20</b>	<b>34,526.00</b>

<sup>8</sup> Energy efficiency cost recovery factor

## 5.3 DETAILED FINDINGS—COMMERCIAL

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

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
17.4%	3,615	3,615	100.0%	49.0%	15,054,617	15,054,617	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 PY2020 Large C&I Solutions MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

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

**Participant ID 1313285:** The energy efficiency project included interior and exterior LED lighting retrofits at a non-refrigerated warehouse. During the desk review, the EM&V team determined that two installed exterior lamp fixtures claimed as *non-qualified* should *qualify* at 150.0 W and 300.0 W using the DesignLights Consortium (DLC) QPL. In addition, one lighting fixture was rounded to 99.5 W from 100.0 W. This adjustment resulted in 119 percent kilowatt and 118 percent kilowatt-hour increased savings.

#### 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; Air Conditioning, Heating, and Refrigeration Institute (AHRI) certifications) for most projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications and AHRI certifications, pre-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*.

### 5.3.2 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
5.7%	1,191	1,191	100.0%	16.9%	5,197,201	5,197,201	100.0%	Good

Completed desk reviews*
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 PY2020 Texas SCORE MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team did not adjust claimed savings for projects evaluated. El Paso Electric accepted the evaluated results, and the final program realization rate is 100 percent.

#### Documentation Score

The EM&V team was able to verify most key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for all projects that had desk reviews completed because sufficient documentation was provided for the sites. The project documentation included invoices, QPL qualifications, pre-inspection and post-inspection notes, project savings calculators, and photographic documentation of the existing and new lighting types. Creating these documents is a significant effort by the utility to represent equipment conditions and quantities. One exception is the documentation related to lighting controls for a project which did not include lighting controls specifications, although this was provided when requested. Therefore, the EM&V team assigned a program documentation score of *good*.



## 5.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

### 5.4.1 Commercial Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
50.1%	10,397	10,397	100.0%	0.1%	40,975	40,975	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. Load management events in PY2020 occurred on the following dates and times:

- July 12, 2020, from 3:00 p.m. to 5:00 p.m. (scheduled); and
- August 13, 2020, from 4:00 p.m. to 7:00 p.m. (unscheduled).

The EM&V team received the interval meter data and spreadsheets detailing the El Paso Electric calculated baseline load, event load, and savings results for each event and meter. The EM&V team reviewed the data for the 13 sponsors across 25 sites. All sites participated in the scheduled or test event. Due to the COVID-19 pandemic, five sites were hospitals and were not called during unscheduled events. Another site was excluded from the savings calculations because of a meter failure.

After the EM&V team applied the *High 5 of 10* baseline calculation method, it was found that the evaluated savings matched the savings El Paso provided for all sites. The kilowatt savings for each site were calculated by averaging the kilowatt reductions of both events; the kilowatt-hour savings for each site were calculated by multiplying the kilowatt savings by the total number of event hours. Program-level savings were calculated by adding all site-level savings. A negligible difference in program-level kilowatt savings (less than 1 kW) is attributed to rounding practices during calculations. El Paso Electric accepted the evaluated results and matched the claimed kilowatt savings to the evaluated kilowatt 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 Commercial Load Management program are 10,397 kW and 40,975 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

## 5.4.2 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
9.5%	1,968	1,968	100.0%	2.9%	889,658	889,658	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 Residential Load Management MTP by applying the deemed savings value from the TRM. Load management events in PY2020 occurred on the following dates and times:

- August 6, 2020, from 3:00 p.m. to 5:00 p.m. (unscheduled),
- August 11, 2020, from 3:00 p.m. to 5:00 p.m. (unscheduled),
- August 12, 2020, from 3:00 p.m. to 5:00 p.m. (unscheduled),
- August 13, 2020, from 3:00 p.m. to 5:00 p.m. (unscheduled),
- August 19, 2020, from 3:00 p.m. to 5:00 p.m. (unscheduled),
- August 20, 2020, from 3:00 p.m. to 5:00 p.m. (unscheduled),
- September 3, 2020, from 3:00 p.m. to 5:00 p.m. (unscheduled), and
- September 24, 2020, from 3:00 p.m. to 5:00 p.m. (unscheduled).

The EM&V team received a list of participants in the program and a *Residential Load Management Summary* report. After a couple of meetings with the new program implementer and additional data, the EM&V team determined the number of participating devices for each event and applied the deemed savings value from the TRM to calculate the overall savings. The number of participating devices was adjusted based on the additional data provided, which slightly decreased the savings.

In addition to savings from the load management events, El Paso Electric claimed savings from new thermostat devices purchased through their Marketplace website and enrolled in the load management program at the time of the purchase. The EM&V team accepted these claimed savings but plans to meet with El Paso Electric to discuss how to best claim the savings for those types of devices in the future and avoid any double-counting with the Marketplace program. The results of these discussions will be reflected in the TRM to provide more guidance and increase transparency. The EM&V team will also continue working with the new program implementer to improve the documentation of program participants. 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 1,968 kW and 889,658 kWh with realization rates of 99 percent kilowatt and 100 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, with a documentation score of *good*.

## 5.5 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

For PY2020, a census tracking system review was conducted on the following programs to assess whether the tracking data requirements outlined in PY2020 TRM 7.0 are met and if claimed savings can be replicated.

Table 24 summarizes claimed savings for El Paso Electric's programs in PY2020 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2020 tracking data provided to the EM&V team for the EM&V database.

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

- roof reflectance,
- steep/low slope,
- existing ceiling/roof deck insulation type,
- house square footage,
- age of retired equipment,
- existing window type, and
- single or double pane.

The EM&V team also found that the effective useful life used to calculate lifetime savings for lighting projects was nine years instead of the TRM stipulated ten years for low-income programs or eight years for all other programs.

**Table 24. PY2020 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)
Hard-to-Reach Solutions MTP	4.6%	964	964	100.0%	4.2%	1,302,829	1,302,829	100.0%
Texas Appliance Recycling MTP	0.4%	76	76	100.0%	2.0%	620,400	620,400	100.0%
LivingWise MTP	1.6%	326	326	100.0%	2.8%	855,290	855,290	100.0%
Small Commercial Solutions MTP	3.0%	750	750	100.0%	9.5%	2,925,568	2,925,658	100.0%
Residential Solutions MTP	3.5%	734	734	100.0%	4.0%	1,219,380	1,219,380	100.0%
Residential Marketplace Pilot (MTP)	3.0%	627	627	100.0%	7.0%	2,152,247	2,152,247	100.0%
Commercial Marketplace Pilot (MTP)	0.4%	91	91	100.0%	1.4%	446,259	446,259	100.0%

## 6.0 ENTERGY TEXAS, INC. IMPACT EVALUATION RESULTS

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

Entergy's evaluated savings for program year (PY) 2020 were 19,791 in demand (kilowatt, kW) and 44,362,546 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 (Table 28), supporting healthy realization rates.

Table 25 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 25. Entergy PY2020 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>20,015</b>	<b>20,015</b>	<b>100.0%</b>	<b>0.0%</b>
Commercial	31.0%	6,196	6,196	100.0%	0.0%
Residential	37.9%	7,588	7,588	100.0%	0.0%
Load management*	31.1%	6,231	6,231	100.0%	N/A

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

Table 26 shows the claimed and evaluated energy savings for Entergy’s portfolio and broad customer sector and program categories for PY2020.

**Table 26. Entergy 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>44,885,314</b>	<b>44,885,314</b>	<b>100.0%</b>	<b>0.0%</b>
Commercial	70.8%	31,760,192	31,760,192	100.0%	0.0%
Residential	29.2%	13,118,891	13,118,891	100.0%	N/A
Load management*	0.0%	6,231	6,231	100.0%	N/A

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

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

In program-level realization rates, we have also included a program documentation score of *good*, *fair*, or *limited*, as discussed in Section 3. For the overall utility program documentation score, the score of *good* was given if 90 percent or more of the evaluated savings estimates received a score of *good* or *fair* due to program documentation received as indicated in detailed program findings. A score of *fair* was given if 70 percent to 89 percent of the evaluated savings estimates received a score of *good* or *fair*. A score of *limited* was given if less than 70 percent of savings received a score of *good* or *fair*. In general, a score of *good* indicates the utility has established processes to collect sufficient documentation to verify savings. A score of *fair* also indicates established processes with some areas of improvement identified. A score of *limited* indicates program documentation improvements across more individual programs or high savings programs have been identified. Entergy received *good* documentation scores for all of its evaluated programs in PY2020.

### 6.1.2 Cost-Effectiveness Results

Entergy’s overall portfolio had a cost-effectiveness score of 4.6.

The more cost-effective programs were the Commercial Solutions Market Transformation Program (MTP) and the Residential Solutions MTP; the less cost-effective programs were the Hard-to-Reach Standard Offer Program (SOP) and the Load Management SOP. All of Entergy’s programs were cost-effective in 2020.

The lifetime cost of evaluated savings was \$0.014 per kilowatt-hour and \$9.67 per kilowatt.

**Table 27. Entergy Cost-Effectiveness Results**

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
<b>Total portfolio</b>	<b>4.61</b>	<b>4.61</b>	<b>4.13</b>
<b>Total portfolio excluding low-income programs</b>	<b>4.61</b>	<b>4.61</b>	<b>4.13</b>
<b>Commercial</b>	<b>6.43</b>	<b>6.43</b>	<b>5.64</b>
Commercial Solutions MTP	6.43	6.43	5.64
<b>Residential</b>	<b>3.32</b>	<b>3.32</b>	<b>3.06</b>
Residential SOP	2.96	2.96	2.67
Residential Solutions MTP	5.18	5.18	4.69
Hard-to-Reach SOP	2.37	2.37	2.37
<b>Load management</b>	<b>1.58</b>	<b>1.58</b>	<b>1.58</b>
Load Management SOP	1.58	1.58	1.58

## 6.2 CLAIMED SAVINGS ADJUSTMENTS

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

**Table 28. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF<sup>9</sup> Filing)**

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial Solutions MTP	-204.3	0.00
<b>Total</b>	<b>-204.3</b>	<b>0.00</b>

<sup>9</sup> Energy efficiency cost recovery factor

## 6.3 DETAILED FINDINGS—COMMERCIAL

### 6.3.1 Commercial Solutions Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
31.0%	6,196	6,196	100.0%	70.8%	31,760,192	31,760,192	100.0%	Good

Completed desk reviews*
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 PY2020 Commercial Solutions MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for three projects. Two additional projects were similar to two of the projects reviewed by the EM&V team and therefore received similar adjustments as described below. All five projects had adjustments greater than five percent compared to the claimed initial 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 1312905:** The energy efficiency project was a continuous energy improvement project of a program participant that managed school facilities. The energy savings are based on actual energy consumption comparisons using information from June 2019 to May 2020. However, the school paused operation from March 2020 to May 2020, which required the analysis to make a non-routine adjustment. During the desk review, the EM&V team accepted the adjustment for kilowatt-hour savings but did not accept the adjustment for peak kilowatt savings. The peak kilowatt savings was reduced to 161.1 kW from 214.2 kW; this adjustment decreased the peak demand and resulted in realization rates of 75 percent kilowatt and 100 percent kilowatt-hour.

**Participant ID 1312906:** The energy efficiency project was a continuous energy improvement project of a program participant that managed school district facilities. The energy savings are based on actual energy consumption comparisons using information from June 2019 to May 2020. However, the school paused operation from March 2020 to May 2020, which required the analysis to make a non-routine adjustment. During the desk review, the EM&V team accepted the adjustment for kilowatt-hour savings but did not accept the adjustment for peak kilowatt savings. The peak kilowatt savings was reduced to 31.1 kW from 41.6 kW; this adjustment decreased the peak demand and resulted in realization rates of 75 percent kilowatt and 100 percent kilowatt-hour.



**Participant ID 1312907:** The energy efficiency project was a continuous energy improvement project, and the evaluation results are based on a combination of Participant ID 1312905 and Participant ID 1312906. The energy savings are based on actual energy consumption comparisons using information from June 2019 to May 2020, similar to the previous program participants (Participant ID 1312905 and Participant ID 1312906). The data collection did not occur from March 2020 to May 2020, leading to a non-routine adjustment. For the projects with a desk review completed in this program, the EM&V team accepted the non-routine adjustment for kilowatt-hour savings but did not accept the non-routine adjustment for peak kilowatt savings. The EM&V team reduced the peak kilowatt savings by applying the realization rate of similar desk-reviewed projects. Peak kilowatt was reduced to 13.4 kW from 20.5 kW; the adjustments represent realization rates of 75 percent kilowatt and 100 percent kilowatt-hour.

**Participant ID 1312908:** The energy efficiency project was a continuous energy improvement project, and the evaluation results are based on a combination of Participant ID 1312905 and Participant ID 1312906. The energy savings are based on actual energy consumption comparisons using information from June 2019 to May 2020, similar to the above program participants (Participant ID 1312905 and Participant ID 1312906). The data collection did not occur from March 2020 through May 2020, leading to a non-routine adjustment. For the projects with a desk review completed in this program, the EM&V team accepted the non-routine adjustment for kilowatt-hour savings but did not accept the non-routine adjustment for peak kilowatt savings. The EM&V team reduced the peak kilowatt savings by applying the realization rate of similar desk-reviewed projects. Peak kilowatt was reduced to 435.5 kW from 581.6 kW; the adjustments represent realization rates of 75 percent kilowatt and 100 percent kilowatt-hour.

**Participant ID 1312999:** The energy efficiency project included interior and exterior lighting retrofits at a large chain hardware store. During the desk review, the EM&V team adjusted the exterior lighting type to the technical reference manual (TRM) prescriptive *outdoor less than dusk to dawn* from the claimed *custom* building type. Documentation was not submitted to support the custom exterior lighting hours. This adjustment increased peak demand savings and resulted in realization rates of 108 percent for kilowatt and 100 percent for kilowatt-hour.

## Documentation Score

EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity; equipment capacity; Qualified Products List (QPL) qualifications; Air Conditioning, Heating, and Refrigeration Institute (AHRI) certifications) for most projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications and AHRI certifications, pre-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. Partial documentation was provided for two midstream lighting projects that initially lacked installed model numbers, associated specification sheets, and QPL certifications. The utility provided the information upon request. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

## 6.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

### 6.4.1 Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
31.1%	6,231	6,231	100.0%	0.0%	6,231	6,231	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 PY2020 occurred on the following dates and times:

- July 7, 2020, from 2:00 p.m. to 3:00 p.m. (unscheduled),
- July 9, 2020, from 2:00 p.m. to 3:00 p.m. (unscheduled),
- July 10, 2020, from 1:00 p.m. to 2:00 p.m. (unscheduled),
- July 13, 2020, from 1:00 p.m. to 2:00 p.m. (unscheduled),
- July 14, 2020, from 1:00 p.m. to 2:00 p.m. (unscheduled),
- July 15, 2020, from 1:00 p.m. to 2:00 p.m. (unscheduled), and
- July 17, 2020, from 2:00 p.m. to 3:00 p.m. (unscheduled).

The EM&V team received interval meter data and a spreadsheet that summarized the event-level savings for the eight sponsors across 53 sites. There were no scheduled events in PY2020, and nine 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 savings 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.

Evaluated savings for the Entergy Load Management SOP are 6,231 kW and 6,231 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

## 6.5 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

For PY2020, a census tracking system review was conducted on the following programs to assess whether the tracking data requirements outlined in PY2020 TRM 7.0 are met and if claimed savings can be replicated. The EM&V team determined all data inputs required for claimed measures were met and did not adjust the claimed savings

Table 29 summarizes claimed savings for Entergy’s programs in PY2020 that only received a tracking system review for program impacts. The programs’ claimed savings were verified against the final PY2020 tracking data provided to the EM&V team for the EM&V database.

**Table 29. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs)**

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Residential SOP	19.1%	3,814	3,814	100.0%	12.9%	5,774,166	5,774,166	100.0%
Residential Solutions MTP	10.0%	2,006	2,006	100.0%	10.4%	4,651,821	4,651,821	100.0%
Hard-to-Reach SOP	8.8%	1,768	1,768	100.0%	6.0%	2,692,904	2,692,904	100.0%

## 7.0 ONCOR ELECTRIC DELIVERY, LLC IMPACT EVALUATION RESULTS

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

Oncor's evaluated savings for program year (PY) 2020 were 233,715 in demand (kilowatt, kW) and 294,624,026 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 33), supporting healthy realization rates.

Table 30 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 30. Oncor PY2020 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>233,715</b>	<b>233,715</b>	<b>100.0%</b>	<b>0.0%</b>
Commercial	20.0%	46,730	46,733	100.0%	0.1%
Residential	16.5%	38,545	38,545	100.0%	N/A
Low-income	1.6%	3,707	3,707	100.0%	N/A
Load management*	61.9%	144,732	144,732	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 31 shows the claimed and evaluated energy savings for Oncor's portfolio and broad customer sector and program categories for PY2020.

**Table 31. 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>294,613,994</b>	<b>294,624,026</b>	<b>100.0%</b>	<b>0.1%</b>
Commercial	37.9%	111,698,198	111,698,198	100.0%	0.1%
Residential	59.7%	175,725,437	175,725,437	100.0%	N/A
Low-income	2.3%	6,756,162	6,755,994	100.0%	N/A
Load management*	0.1%	434,197	434,197	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. Oncor received *good* program documentation scores for all of its evaluated programs in PY2020.

## 7.1.2 Cost-Effectiveness Results

Oncor's overall portfolio had a cost-effectiveness score of 4.0, or 4.4 excluding low-income programs.

The more cost-effective programs were the Retail Platform Market Transformation Program (MTP) and the Commercial Standard Offer Program (SOP). The Commercial Retail Platform MTP shows particularly high cost-effectiveness since the program allocates five percent of the lamps sold and budget from the residential sector program. The commercial sector applies higher savings assumptions, resulting in higher cost-effectiveness results. The less cost-effective programs were the Retro-Commissioning MTP and the Residential Demand Response SOP. All of Oncor's programs—except for the Retro-Commissioning MTP—were cost-effective in 2020.

The lifetime cost of evaluated savings was \$0.017 per kilowatt-hour and \$12.67 per kilowatt.

**Table 32. Oncor Cost-Effectiveness Results**

Level of analysis	Claimed savings results	Evaluate dsavings results	Net savings results
<b>Total portfolio</b>	<b>4.01</b>	<b>4.01</b>	<b>3.16</b>
<b>Total portfolio excluding low-income programs</b>	<b>4.37</b>	<b>4.37</b>	<b>3.42</b>
<b>Commercial</b>	<b>4.84</b>	<b>4.84</b>	<b>4.07</b>
Commercial SOP	4.65	4.65	4.22
Solar PV SOP	2.42	2.42	2.45
Small Business Direct Install MTP	2.64	2.64	2.51
Retail Platform MTP	57.76	57.76	28.88
Retro-Commissioning MTP	0.75	0.75	0.67
<b>Residential</b>	<b>4.61</b>	<b>4.61</b>	<b>3.36</b>
Home Energy Efficiency SOP	3.51	3.51	3.17
Solar PV SOP	2.41	2.41	2.31
Retail Platform MTP	10.77	10.77	5.39
Hard-to-Reach SOP	2.55	2.55	2.55
<b>Low-income*</b>	<b>1.90</b>	<b>1.90</b>	<b>1.90</b>
Targeted Weatherization Low-Income SOP*	1.90	1.90	1.90
<b>Load management</b>	<b>1.55</b>	<b>1.55</b>	<b>1.55</b>
Commercial Load Management SOP	1.62	1.62	1.62
Residential Demand Response SOP	1.39	1.39	1.39

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

## 7.2 CLAIMED SAVINGS ADJUSTMENTS

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

**Table 33. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF<sup>10</sup> Filing)**

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
<b>Total</b>	<b>0.00</b>	<b>0.00</b>

<sup>10</sup> Energy efficiency cost recovery factor

## 7.3 DETAILED FINDINGS—COMMERCIAL

### 7.3.1 Commercial Standard Offer Program (SOP) (Custom and Basic)

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%	14,776	14,780	100.0%	23.5%	69,110,224	69,128,540	100.0%	Good

Completed desk reviews*
16

\* 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 PY2020 Basic and Custom Commercial SOP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for four projects. All had adjustments that were less than five percent. There were zero projects with 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 four projects; therefore, the final program realization rate is nearly 100 percent. Further details of the EM&V findings are provided below.

**Participant ID 1298934:** The energy efficiency project included interior LED retrofits of high-bay light fixtures in a non-refrigerated warehouse. During the desk review, the EM&V team corrected the wattages for a single installed fixture by rounding it to the nearest half-watt; the fixture was adjusted from 195.5 W to 195.0 W. The wattage adjustments resulted in a slight increase in energy and peak demand savings and realization rates of 100 percent kilowatt and kilowatt-hour.

**Participant ID 1298936:** The energy efficiency project included an interior LED lighting and controls upgrade of a new construction non-refrigerated warehouse. During the desk review, the EM&V team adjusted the wattage for an installed fixture based on the DesignLights Consortium (DLC) Qualified Products List (QPL) from 236.5 W claimed to 236.0 W and adjusted the wattage for another installed fixture based on the ENERGY STAR® QPL from 15.5 W claimed to 15.0 W. These corrections increased savings slightly. The lighting controls associated with these fixtures reduced savings slightly because the fixtures control less lighting wattage. Overall, the adjustments resulted in a slight increase in energy and peak demand savings. The realization rates for kilowatt and kilowatt-hour rounded to 100 percent.



**Participant ID 1298958:** The energy efficiency project included an interior LED lighting and controls upgrade of a new construction non-refrigerated warehouse. During the desk review, the EM&V team adjusted the wattage for an installed fixture based on the DLC QPL from 163.5 W claimed to 163.0 W. The EM&V team adjusted the wattage for another installed fixture based on the ENERGY STAR QPL from 45.5 W claimed to 45.0 W. These corrections increased savings slightly. The lighting controls associated with these fixtures reduced savings slightly because the fixtures control less lighting wattage. Overall, the adjustments resulted in a slight increase in energy and peak demand savings. The realization rates for kilowatt and kilowatt-hour rounded to 100 percent.

**Participant ID 1298967:** The energy efficiency project included an interior and exterior LED retrofit of a manufacturing facility with three shifts, including the associated warehouse and office areas. During the desk review, the EM&V team corrected the wattages for a single installed fixture by rounding it to the nearest half-watt; the fixture was adjusted from 80.5 W to 81.0 W. The wattage adjustments resulted in a slight decrease in energy and peak demand savings. The realization rates for kilowatt and kilowatt-hour 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 fifteen projects that had desk reviews completed 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. However, partial documentation was provided for the lighting controls on one project. The EM&V team was unable to verify the lighting control quantities and installation locations from the documentation. 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*.

### 7.3.2 Retro-Commissioning Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
0.0%	0	0	0	0	435,190	435,190	100.0%	Good

Completed desk reviews*
1

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

The PY2020 Retro-Commissioning MTP evaluation efforts focused on desk reviews of the only project in the program. The EM&V team did not adjust the claimed savings for the project. The final program realization rate is 100 percent.

### Documentation Score

The EM&V team was able to verify key inputs and assumptions for the project. However, the documentation of the key parameters of the project was challenging to identify in the calculator, and several were not documented in the reports. The project documentation included a single report which had sections added as the project progressed; this approach made it difficult to identify the changed conditions in installation versus the estimated conditions at the beginning of the project. Best practice would be to submit distinct reports for the planned implementation, completed implementation, and the verified project implemented components, each with documentation of the key parameters in the calculations as understood at the time of the report. Complete documentation during the different phases of retro-commissioning projects enhances the accuracy and transparency of the savings and ease of evaluation. Overall, the EM&V team assigned a program documentation score of *good* for the first project in this program.

## 7.4 DETAILED FINDINGS—CROSS-SECTOR

### 7.4.1 Retail Platform Market Transformation Program (MTP)

Sector	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
Residential	9.6%	22,441	22,441	100.0%	37.2%	109,642,301	109,642,301	100.0%	Good
Commercial	3.1%	7,175	7,175	100.0%	9.9%	29,243,433	29,243,433	100.0%	N/A

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 PY2020 Retail Platform MTP evaluation efforts focused on a documentation review. There were no savings adjustments made for this program.

### Documentation Score

Due to the nature of the midstream program delivery, documentation requirements differ from that of a standard offer program. Typical tracking and documentation for midstream programs can include but are not limited to monthly store invoices, aggregate customer data, quantity purchased, and model numbers of purchased measures. Oncor provided invoices, aggregate customer data, customer coupon codes, quantity purchased, rebates paid, SKU numbers, and thermostat models. The EM&V team determined that Oncor provided sufficient documentation for the Retail Platform MTP. Overall, the EM&V team assigned a program documentation score of *good* for the residential portion of the program.

## 7.4.2 Solar PV Standard Offer Program (SOP)

Sector	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
Residential	0.7%	1,555	1,555	100.0%	1.8%	5,261,327	5,261,327	100.0%	N/A
Commercial	1.0%	2,251	2,251	100.0%	2.5%	7,262,460	7,262,460	100.0%	Good

Completed desk reviews*
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 PY2020 Solar PV SOP evaluation efforts focused on desk reviews for the commercial portion of the program. Residential solar PV projects were not sampled for desk reviews. The sample of completed desk review projects for this program is listed above.

The EM&V team did not adjust the claimed savings for projects reviewed. The final program realization rate is 100 percent.

### Documentation Score

For the commercial portion of the program, the EM&V team was able to verify key inputs and assumptions (e.g., panel model, quantity, tilt, and the azimuth of the installation) for the three projects. The project documentation did not include the module efficiency and estimates of electric production from an Application Programming Interface (API) connection to PV Watts, which could not be documented through the requested information. The EM&V team created the PV Watts savings estimation documents to confirm the results provided. Most of the key parameters were provided in the post-inspection notes, including documentation of the adjustments made in the installation from the proposal. 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* for the commercial portion of the program.

## 7.5 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

### 7.5.1 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
44.1%	103,120	103,120	100.0%	0.1%	309,359	309,359	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 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 at the electric service identifier ID (ESIID) level. A single load management event occurred in PY2020 on June 18, 2020, from 2:00 p.m. to 5:00 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 18 sponsors and 256 ESIIDs. 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 PY2020 TRM 7.0, the negative savings can be set to zero for cases that produce negative savings. The table above shows both the EM&V team (evaluated) and Oncor's (claimed) calculated kilowatt and kilowatt-hour savings.

The evaluated savings for Oncor's Commercial Load Management SOP are 104,031 kW and 312,093 kWh. These savings were matched to Oncor's contracted savings claimed in their Energy Efficiency Plan and Report—103,120 kW and 312,093 kWh—therefore, the realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

## 7.5.2 Residential Demand Response Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
17.8%	41,613	46,613	100.0%	0.0%	124,838	124,839	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 Demand Response SOP by applying the TRM calculation methodology to interval meter data. The meter data were supplied in 15-minute increments at the ESIID level. A single demand response event occurred in PY2020 on June 18, 2020, 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 ESIID. 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 0.42 percent of the program population and were included for each service provider by applying the average savings (per PY2020 TRM 7.0, 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). The EM&V team was able to confirm that verified savings matched Oncor's savings calculation. The table above shows both the EM&V team (evaluated) and Oncor's (claimed) calculated kilowatt and kilowatt-hour savings. The minor difference in kilowatt-hours is due to rounding practices.

Evaluated savings for the Oncor Residential Demand Response SOP are 41,613 kW and 124,838 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

## 7.6 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 34 summarizes claimed savings for Oncor's programs in PY2020 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2020 tracking data provided to the EM&V team for the EM&V database.

Overall, the evaluated programs achieved 100 percent realization rates for energy and demand savings. However, the EM&V team found discrepancies in calculations for two measures—*ceiling insulation* and *refrigerators*—resulting in slightly different evaluated savings from claimed savings. The EM&V team found that claimed savings for *ceiling insulation* measures with window air conditioning (AC) units only partially applied the space cooling adjustment factor prescribed by PY2020 TRM 7.0. The PY2020 claimed savings for refrigerators were calculated using the specified method in PY2019 TRM 6.0 instead of PY2020 TRM 7.0.

**Table 34. PY2020 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 Energy Efficiency SOP	9.2%	21,414	21,413	100.0%	13.5%	39,869,056	39,865,541	100.0%
Targeted Weatherization Low-Income SOP	1.6%	3,707	3,707	100.0%	2.3%	6,756,162	6,755,994	100.0%
Hard-to-Reach SOP	6.2%	14,549	14,546	100.0%	7.1%	20,952,752	20,948,152	100.0%

## 7.7 SUMMARY OF LOW EVALUATION PRIORITY PROGRAMS

Table 35 summarizes claimed savings for Oncor's low evaluation priority programs in PY2020, including the programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2020 tracking data provided to the EM&V team for the EM&V database.

**Table 35. PY2020 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)
Small Business Direct Install MTP	0.5%	1,114	1,114	100.0%	1.9%	5,646,892	5,646,892	100.0%

## 8.0 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.

### 8.1 KEY FINDINGS

#### 8.1.1 Evaluated Savings

SWEPCO's evaluated savings for program year (PY) 2020 were 10,508 in demand (kilowatt, kW) and 16,094,426 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 39), supporting healthy realization rates.

Table 36 shows the claimed and evaluated demand savings for SWEPCO's portfolio and broad customer sector and program categories for PY2020 and precision at 90 percent confidence. Residential and load management results are based on census reviews, and therefore precisions calculations are not applicable (N/A). For all commercial sampled projects where evaluated and claimed savings differed, SWEPCO matched evaluated savings, so precision is also N/A.

**Table 36. SWEPCO PY2020 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>10,508</b>	<b>10,508</b>	<b>100.0%</b>	<b>0.0%</b>
Commercial	20.0%	2,102	2,102	100.0%	0.0%
Residential	33.5%	3,517	3,517	100.0%	N/A
Load management*	46.5%	4,889	4,889	100.0%	N/A

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



Table 37 shows the claimed and evaluated energy savings for SWEPCO's portfolio and broad customer sector and program categories for PY2020.

**Table 37. SWEPCO 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>16,094,426</b>	<b>16,094,426</b>	<b>100.0%</b>	<b>0.0%</b>
Commercial	64.2%	10,336,451	10,336,451	100.0%	0.0%
Residential	35.5%	5,711,101	5,711,101	100.0%	N/A
Load management*	0.3%	46,874	46,874	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. SWEPCO received *good* program documentation scores for all its programs in PY2020.

### 8.1.2 Cost-Effectiveness Results

SWEPCO's overall portfolio had a cost-effectiveness score of 3.8.

The more cost-effective programs were the Commercial Solutions Market Transformation Program (MTP) and the Commercial Standard Offer Program (SOP). The less cost-effective programs were the Load Management SOP and the Hard-to-Reach SOP. All of SWEPCO's programs were cost-effective in 2020.

The lifetime cost of evaluated savings was \$0.016 per kilowatt-hour and \$11.32 per kilowatt.

**Table 38. SWEPCO Cost-Effectiveness Results**

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
<b>Total portfolio</b>	<b>3.83</b>	<b>3.83</b>	<b>3.51</b>
<b>Commercial</b>	<b>4.97</b>	<b>4.97</b>	<b>4.47</b>
Commercial Solutions MTP	4.96	4.96	4.36
Commercial SOP	5.90	5.90	5.35
Open MTP	3.10	3.10	2.95
SCORE MTP	4.95	4.95	4.33
<b>Residential</b>	<b>3.16</b>	<b>3.16</b>	<b>2.96</b>
Residential SOP	3.29	3.29	2.97
Hard-to-Reach SOP	2.95	2.95	2.95
<b>Load management</b>	<b>1.48</b>	<b>1.48</b>	<b>1.48</b>
Load Management SOP	1.48	1.48	1.48

## 8.2 CLAIMED SAVINGS ADJUSTMENTS

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

**Table 39. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF<sup>11</sup> Filing)**

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial SOP	0.00	244.00
Open MTP	-26.06	-165,092.00
SCORE MTP	-0.30	-2,143.00
<b>Total</b>	<b>-26.34</b>	<b>-166,991.00</b>

<sup>11</sup> 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
6.2%	653	653	100.0%	17.7%	2,840,667	2,840,667	100.0%	Good

Completed desk reviews*
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 PY2020 Commercial Solutions MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above. The EM&V team recommended one minor adjustment, which did not adjust the realization rate. SWEPCO accepted the evaluated results and matched the claimed savings to those of the project's evaluations, and therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

**Participant ID 1313368:** The energy efficiency project included an interior LED retrofit of the common area and rooms at a hotel and an exterior LED retrofit of the parking and gathering areas. During the desk review, the EM&V team corrected the wattages for a single installed fixture by rounding to the nearest half-watt; the fixture was adjusted from 8.0 W to 7.5 W. The wattage adjustments resulted in a slight increase in energy and peak demand savings and realization rates of 100 percent kilowatt and kilowatt-hour.

#### 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; Air Conditioning, Heating, and Refrigeration Institute (AHRI) certifications) for all projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications, pre-install and post-install inspection notes, project savings calculators, and photographic documentation of the existing and new equipment. The EM&V team recognizes the significant effort by the utility to verify equipment conditions and quantities. Sufficient documentation was provided for all projects; therefore, the EM&V team assigned a program documentation score of *good*.

### 8.3.2 Commercial Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
7.8%	815	815	100.0%	28.3%	4,550,713	4,550,713	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 PY2020 Commercial SOP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for three projects. One project had an adjustment of less than five percent, and two projects 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 1307980:** The energy efficiency project included interior and exterior lighting retrofits at a school operated by a religious organization. During the desk review, the EM&V team corrected wattages for an installed fixture using the DesignLights Consortium (DLC) QPL from 300.0 W claimed to 329.0 W. The wattage adjustments resulted in a slight decrease in energy and peak demand savings, and realization rates remained at 100 percent kilowatt and kilowatt-hour.

**Participant ID 1307984:** The energy efficiency project included installing interior and exterior lighting retrofits at a manufacturing plant with two shifts. During the desk review, the EM&V team corrected installed fixture wattages from the DLC QPL from 33.0 W claimed to 32.5 W and LED tubes from 16.0 W claimed to 15.5 W. This component increased savings slightly. The EM&V team also adjusted the pre-install fixtures from eight-foot lengths to four-foot lengths based on the submitted pre-install photos. This component significantly reduced the energy savings. Overall, the wattage adjustments and baseline fixture adjustment resulted in a decrease in energy and peak demand savings and 77 percent kilowatt and kilowatt-hour realization rates.

**Participant ID 11308000:** The energy efficiency project included a retrofit of the evaporator fan motors for the walk-in coolers and freezers at a retail location. During the desk review, the EM&V team adjusted the tracking data to match the submitted ex-ante calculator savings estimate. These adjustments resulted in a significant decrease of tracked energy and peak demand savings and realization rates of 23 percent kilowatt and kilowatt-hour.

## Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for three of the four projects that had desk reviews completed. Sufficient documentation was provided for the sites. The project documentation included invoices, QPL qualifications, pre-inspection and post-inspection notes, project savings calculators, and photographic documentation of the existing and new lighting types, which are significant efforts by the utility to verify equipment conditions and quantities. However, partial documentation was provided for the other project. The documentation lacked detailed information about the installation location. Despite the missing documentation, the EM&V team evaluated savings for this project, although more conservatively than if the information was documented. Sufficient documentation was provided for most of the projects. Therefore, the EM&V team assigned a program documentation score of *good*.

### 8.3.3 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
3.5%	371	371	100.0%	11.2%	1,804,518	1,804,518	100.0%	Good

Completed desk reviews*
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 PY2020 SCORE MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for one project. The one project had adjustments of less 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 1313359:** The energy efficiency project is a new construction high school that included energy-efficient HVAC units, lighting fixtures, and lighting controls. During the desk review, the EM&V team corrected wattages for an installed fixture rounding from the DLC QPL from 111.0 W claimed to 107.0 W. Several interior LED fixtures and lamps were determined *non-qualified* based on a review of the ENERGY STAR® and DLC QPL. The two adjustment types resulted in a slight decrease in energy and peak demand savings, and realization rates remained at 100 percent kilowatt and 99 percent kilowatt-hour.

## Documentation Score

The EM&V team was able to verify 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. The project documentation included invoices, QPL qualifications, pre-install and post-install inspection notes, project savings calculators, and photographic documentation of the existing and new lighting types, which are significant efforts by the utility to verify equipment conditions and quantities. However, one of the projects was missing two QPL qualification documents. The EM&V team was able to identify the equipment within the QPL listing and verify the install. Sufficient documentation was provided for the projects; therefore, the EM&V team assigned a program documentation score of *good*.

## 8.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

### 8.4.1 Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
46.5%	4,889	4,889	100.0%	0.3%	46,874	46,874	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 PY2020 occurred on the following dates and times:

- May 27, 2020, from 2:00 p.m. to 3:00 p.m. (scheduled),
- May 28, 2020, from 2:00 p.m. to 3:00 p.m. (scheduled),
- June 2, 2020, from 2:30 p.m. to 3:30 p.m. (scheduled),
- June 4, 2020, from 2:00 p.m. to 3:00 p.m. (scheduled),
- June 11, 2020, from 2:00 p.m. to 3:00 p.m. (scheduled),
- June 17, 2020, from 5:00 p.m. to 6:00 p.m. (scheduled),
- July 2, 2020, from 2:00 p.m. to 6:00 p.m. (unscheduled), and
- July 14, 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 seven sites. All sites but one participated in one scheduled event (used as a test event) and at least one of the unscheduled events that followed. One site did not have any load data associated with it for one of the two unscheduled events.

SWEPCO calculated kilowatt savings for each site by applying a weighted average to the kilowatt reductions across both unscheduled events. To calculate kilowatt-hour savings, SWEPCO summed kilowatt reductions of all events (including the scheduled event) and multiplied them by the total number of event hours. In applying this method to the meter level data and following the TRM, the EM&V team calculated kilowatt and kilowatt-hour savings that matched SWEPCO. Therefore, no adjustments were made to the program savings. The table above shows both the EM&V team (evaluated) and SWEPCO's (claimed) calculated kilowatt and kilowatt-hour savings.

Evaluated savings for the SWEPCO Load Management SOP are 4,889 kW and 46,874 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

## 8.5 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 40 summarizes claimed savings for SWEPCO's programs in PY2020 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2020 tracking data provided to the EM&V team for the EM&V database.

**Table 40. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs)**

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Residential SOP	21.0%	2,206	2,206	100.0%	22.8%	3,677,360	3,677,360	100.0%
Hard-to-Reach SOP	12.5%	1,311	1,311	100.0%	12.6%	2,033,741	2,033,741	100.0%
Open MTP	2.5	263	263	100.0%	7.1%	1,140,553	1,140,553	100.0%



## 9.0 TEXAS-NEW MEXICO POWER COMPANY IMPACT EVALUATION RESULTS

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

TNMP's evaluated savings for program year (PY) 2020 were 12,469 in demand (kilowatt, kW) and 16,801,764 in energy (kilowatt-hour, kWh) savings. The overall kilowatt and kilowatt-hour portfolio realization rates are 100 percent. TNMP was responsive to all EM&V recommendations to adjust claimed savings based on EM&V results (Table 44), supporting healthy realization rates.

Table 41 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 41. TNMP PY2020 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>12,469</b>	<b>12,469</b>	<b>100.0%</b>	<b>0.2%</b>
Commercial	18.3%	2,282	2,282	100.0%	1.5%
Residential	38.4%	4,792	4,792	100.0%	N/A
Low-income	3.1%	391	391	100.0%	N/A
Load management*	40.1%	5,004	5,004	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 42 shows the claimed and evaluated energy savings for TNMP's portfolio and broad customer sector and program categories for PY2020.

**Table 42. TNMP 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>16,801,764</b>	<b>16,801,764</b>	<b>100.0%</b>	<b>0.7%</b>
Commercial	47.3%	7,950,576	7,950,576	100.0%	1.7%
Residential	49.4%	8,303,068	8,303,068	100.0%	N/A
Low-income	3.2%	543,117	543,117	100.0%	N/A
Load management*	0.0%	5,004	5,004	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. TNMP's received *good* program documentation scores for all of its evaluated programs in PY2020.

### 9.1.2 Cost-Effectiveness Results

TNMP's overall portfolio had a cost-effectiveness score of 3.4, or 3.6 excluding low-income programs.

The more cost-effective programs were the Residential SOP and the Commercial Solutions MTP; the less cost-effective programs were the Load Management SOP, Low-Income Weatherization program, and the Open for Small Business MTP. All of TNMP's programs were cost-effective in 2020.

The lifetime cost of evaluated savings was \$0.016 per kilowatt-hour and \$11.40 per kilowatt.

**Table 43. TNMP Cost-Effectiveness Results**

Level of analysis	Claimed savings results	Evaluate dsavings results	Net savings results
<b>Total portfolio</b>	<b>3.39</b>	<b>3.39</b>	<b>3.03</b>
<b>Total portfolio excluding low-income programs</b>	<b>3.63</b>	<b>3.63</b>	<b>3.23</b>
<b>Commercial</b>	<b>4.00</b>	<b>4.00</b>	<b>3.56</b>
Open for Small Business MTP	2.24	2.24	2.12
SCORE/CitySmart MTP	3.72	3.72	3.28
Commercial Solutions MTP	5.05	5.05	4.44
<b>Residential</b>	<b>3.60</b>	<b>3.60</b>	<b>3.20</b>
High-Performance Homes MTP	2.75	2.75	1.93
Residential SOP	4.10	4.10	3.70
Hard-to-Reach SOP	2.69	2.69	2.69
<b>Low-income*</b>	<b>2.10</b>	<b>2.10</b>	<b>2.10</b>
Low-Income Weatherization*	2.10	2.10	2.10
<b>Load management</b>	<b>1.17</b>	<b>1.17</b>	<b>1.17</b>
Load Management SOP	1.17	1.17	1.17

\* The low-income sector and Low-Income Weatherization program are evaluated using the savings-to-investment ratio (SIR).

## 9.2 CLAIMED SAVINGS ADJUSTMENTS

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

**Table 44. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF<sup>12</sup> Filing)**

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial Solutions MTP	1.10	7,709.00
SCORE/CitySmart MTP	1.40	1,799.00
<b>Total</b>	<b>2.50</b>	<b>9,508.00</b>

<sup>12</sup> Energy efficiency cost recovery factor

## 9.3 DETAILED FINDINGS—COMMERCIAL

### 9.3.1 Commercial Solutions Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
9.1%	1,136	1,136	100.0%	27.0%	4,541,127	4,541,127	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 PY2020 Commercial Solutions MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for three projects. Each of the three projects had a minor adjustment 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 1313513:** The energy efficiency project included interior and exterior lighting retrofits at a large retail building. During the desk review, the EM&V team corrected wattages for one installed fixture from 151.0 W claimed to 101.0 W using the DesignLights Consortium (DLC) Qualified Products List (QPL). The increase in peak demand and energy savings was minimal, and overall, the adjustments resulted in realization rates of 101 percent kilowatt and kilowatt-hour.

**Participant ID 1313525:** The energy efficiency project included a lighting retrofit of a parking garage. During the desk review, the EM&V team corrected a lighting fixture based on the documentation and concurrently adjusted the wattages for that fixture from 360.0 W claimed to 355.0 W using the DLC QPL. The increase in peak demand and energy savings was minimal, and overall, the adjustments resulted in realization rates of 100 percent kilowatt and kilowatt-hour.

**Participant ID 1313589:** The energy efficiency project included an early retirement of air-cooled air conditioners at a stand-alone retail facility. During the desk review, the EM&V team identified that the claimed savings did not use the value determined in the final ex-ante calculator. The EM&V team used the energy savings from the calculator, which decreased the peak demand and energy savings. Overall, the adjustments resulted in realization rates of 98 percent kilowatt and 97 percent kilowatt-hour.

## 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 three projects that had desk reviews completed because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications, equipment specifications, M&V reports, pre-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. However, the fourth project was solar photovoltaic (PV), and the documentation was sufficient for the equipment, but the critical installation parameter of the tilt was not documented. Overall, the EM&V team was satisfied with the project documentation provided and assigned a program documentation score of *good*.

### 9.3.2 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
5.5%	681	681	100.0%	14.3%	2,404,036	2,404,036	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 PY2020 SCORE/City Smart MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for three projects. Each of the three projects had a minor adjustment 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 1313468:** The energy efficiency project included HVAC controls at an elementary school. During the desk review, the EM&V team reviewed the custom calculation and adjusted the peak demand reduction calculation to match the *PDPF Top 20 Hours* method described in Technical Reference Manual (TRM) Volume 1. The adjusted calculation method decreased peak demand slightly and resulted in realization rates of 97 percent kilowatt and 100 percent kilowatt-hour.

**Participant ID 1313511:** The energy efficiency project included interior and exterior LED lighting retrofits at an elementary school. During the desk review, the EM&V team corrected a lighting fixture based on the documentation and concurrently adjusted the wattages for that fixture from 13.5 W claimed to 12.0 W using the DLC QPL. Overall, the adjustments resulted in realization rates of slightly less than 105 percent kilowatt and 104 percent kilowatt-hour.

**Participant ID 1313533:** The new construction project installed energy-efficient HVAC, lighting, and lighting controls at a school. During the desk review, the EM&V team corrected two instances where a *non-qualified* fixture was marked as *qualified*. The EM&V team also identified several lighting control locations claimed as a *multiple sensor control*. Still, the documentation showed that they were a *simple occupancy sensor* and, in one case, it was not installed. The adjustments decreased energy savings slightly for the project and resulted in realization rates of 99 percent kilowatt and 98 percent kilowatt-hour.

### Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, AHRI certifications) for all projects that had desk reviews completed because sufficient documentation was provided for the sites. The custom project had sufficient documentation to identify the key parameters for energy savings, and the solar PV project included all the necessary documentation to recreate the energy production estimate. Project documentation included invoices, QPL qualifications, equipment specifications, M&V reports, 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 assigned a program documentation score of *good*.

## 9.4 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

### 9.4.1 Load Management Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
40.1%	5,004	5,004	100.0%	0.0%	5,004	5,004	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 meter level. A single load management event occurred in PY2020 on June 3, 2020, from 2:00 p.m. to 3:00 p.m. (scheduled).

The EM&V team received interval meter data and a spreadsheet that summarized the event-level savings for the six sponsors across 44 sites. Forty-two sites participated in the scheduled event, and the remaining two sites did not have any load data associated with them as they did not participate in the event.

Since no unscheduled events were called in PY2020, TNMP calculated kilowatt savings for each site by applying the kilowatt reduction during the scheduled or test event. To calculate kilowatt-hour savings, TNMP summed kilowatt reductions of the scheduled event and multiplied them by the total number of event hours. Applying this method to the meter-level data and following the TRM allowed the EM&V team to calculate kilowatt and kilowatt-hour savings that matched TNMP's. The table above shows both the EM&V team (evaluated) and TNMP's (claimed) calculated kilowatt and kilowatt-hour savings.

Evaluated savings for the TNMP Load Management SOP are 5,004 kW and 5,004 kWh. The realization rates for both kilowatt and kilowatt-hour are 100 percent, with a documentation score of *good*.

## 9.5 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 45 summarizes claimed savings for TNMP's programs in PY2020 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2020 tracking data provided to the EM&V team for the EM&V database.

**Table 45. PY2020 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)
Hard-to-Reach SOP	5.5%	681	681	100.0%	6.6%	1,112,985	1,112,985	100.0%
Residential SOP	28.9%	3,602	3,602	100.0%	35.2%	5,914,248	5,914,248	100.0%



## 9.6 SUMMARY OF LOW EVALUATION PRIORITY PROGRAMS

Table 46 summarizes claimed savings for TNMP's programs in PY2020 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2020 tracking data provided to the EM&V team for the EM&V database.

**Table 46. PY2020 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	4.1%	509	509	100.0%	7.6%	1,275,835	1,275,835	100.0%
Low-Income Weatherization	3.1%	391	391	100.0%	3.2%	543,117	543,117	100.0%
Open for Small Business MTP	3.7%	465	465	100.0%	6.0%	1,005,413	1,005,413	100.0%

## 10.0 XCEL SOUTHWESTERN PUBLIC SERVICE COMPANY IMPACT EVALUATION RESULTS

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

### 10.1 KEY FINDINGS

#### 10.1.1 Evaluated Savings

Xcel SPS's evaluated savings for program year (PY) 2020 were 11,672 in demand (kilowatt, kW) and 25,661,107 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 50), supporting healthy realization rates.

Table 47 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 47. Xcel SPS PY2020 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>11,672</b>	<b>11,672</b>	<b>100.0%</b>	<b>0.0%</b>
Commercial	20.3%	2,369	2,369	100.0%	0.1%
Residential	35.0%	4,086	4,086	100.0%	N/A
Low-income	2.5%	295	295	100.0%	N/A
Load management*	42.2%	4,922	4,922	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 48 shows the claimed and evaluated energy savings for Xcel SPS’s portfolio and broad customer sector and program categories for PY2020.

**Table 48. 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
<b>Total portfolio</b>	<b>100.0%</b>	<b>25,663,272</b>	<b>25,661,107</b>	<b>100.0%</b>	<b>0.0%</b>
Commercial	49.1%	12,593,686	12,591,525	100.0%	0.1%
Residential	47.5%	12,184,980	12,184,980	100.0%	N/A
Low-income	3.1%	805,886	805,886	100.0%	N/A
Load management*	0.3%	78,720	78,716	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.

Xcel SPS received a *good* program documentation score for the Load Management Standard Offer Program (SOP), the Residential Smart Thermostat Market Transformation Program (MTP), and Retro-Commissioning programs; Xcel SPS received *fair* documentation scores for the Commercial SOP program. While a *fair* documentation score indicates a reasonable level of documentation, it also indicates some room for improvement. Detailed evaluation findings and results of the documentation review appear in each specific program section.

## 10.1.2 Cost-Effectiveness Results

Xcel SPS's overall portfolio had a cost-effectiveness score of 4.9, or 5.4 excluding low-income programs.

The more cost-effective programs were the Home Lighting MTP, the Smart Thermostat MTP, and the Commercial SOP. The less cost-effective programs were the Low-Income Weatherization program and the Load Management SOP. The Commercial Home Lighting MTP result stands out at 65.16, but this is a result of how this program is reported. Five percent of the program bulbs and budget are allocated to the commercial sector, but commercial applications generate disproportionate savings that distort the cost-effectiveness results. All of Xcel's programs except for the Load Management SOP were cost-effective in 2020.

The lifetime cost of evaluated savings was \$0.013 per kilowatt-hour and \$9.17 per kilowatt.

**Table 49. Xcel SPS Cost-Effectiveness Results**

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
<b>Total portfolio</b>	<b>4.89</b>	<b>4.89</b>	<b>4.47</b>
<b>Total portfolio excluding low-income programs</b>	<b>5.41</b>	<b>5.41</b>	<b>4.93</b>
<b>Commercial</b>	<b>5.60</b>	<b>5.60</b>	<b>5.07</b>
Commercial SOP	8.05	8.05	7.30
Retro-Commissioning MTP	4.35	4.35	3.91
Small Commercial MTP	2.39	2.39	2.27
Home Lighting MTP	65.16	65.16	58.64
<b>Residential</b>	<b>5.99</b>	<b>5.99</b>	<b>5.48</b>
Residential SOP	3.07	3.07	2.78
Home Lighting MTP	15.25	15.25	13.73
Residential Smart Thermostat MTP	12.13	12.13	10.19
Refrigerator Recycling MTP	2.58	2.58	2.58
Hard-to-Reach SOP	2.61	2.61	2.61
<b>Low-income*</b>	<b>2.23</b>	<b>2.23</b>	<b>2.23</b>
Low-Income Weatherization*	2.23	2.23	2.2
<b>Load management</b>	<b>.87</b>	<b>.87</b>	<b>.87</b>
Load Management SOP	.87	.87	.87

\* The low-income sector and Low-Income Weatherization program are evaluated using the savings-to-investment ratio (SIR).

## 10.2 CLAIMED SAVINGS ADJUSTMENTS

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. Table 50 summarizes claimed savings adjustments recommended by the EM&V team. Realization rates assume the following adjustments will be included in Xcel SPS's May 1 filing.

**Table 50. Evaluation, Measurement, and Verification Claimed Savings Adjustments by Program (Prior to EECRF<sup>13</sup> Filing)**

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial SOP	-15.20	-19,144.40
<b>Total</b>	<b>-15.20</b>	<b>-19,144.4</b>

## 10.3 DETAILED FINDINGS—COMMERCIAL

### 10.3.1 Commercial Standard Offer Program (SOP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
4.8%	566	566	100.0%	11.4%	2,917,683	2,917,683	100.0%	Fair

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 PY2020 Commercial SOP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

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

<sup>13</sup> Energy efficiency cost recovery factor

**Participant ID 1299429:** The energy efficiency project was an interior and exterior LED lighting retrofit of three schools: elementary, junior high, and high school. During the desk review, the EM&V team adjusted the building type of the gymnasium portion of the project from *public assembly* to *educations without summer*. Three LED fixture wattages were adjusted by 0.5 or 1.0 W to match the DesignLights Consortium (DLC) Qualified Products List (QPL). These adjustments reduced peak demand savings and increased energy savings and resulted in realization rates of 67 percent kilowatt and 105 percent kilowatt-hour.

**Participant ID 1299433:** The energy efficiency project was an interior and exterior LED lighting retrofit of a library. During the desk review, the EM&V team adjusted the building type from *office* to *public assembly* to match the technical reference manual's (TRM) definition of a library. The project included several adjustments to lighting wattages for lamps and fixtures based on the certification listing of the materials installed. One adjustment was for rounding to the nearest half-watt, three adjustments were greater than 1.0 W per fixture or lamp, and two adjustments were made for *unqualified* certification. Overall, these adjustments reduced peak demand savings and energy savings and resulted in realization rates of 70 percent kilowatt and 67 percent kilowatt-hour.

**Participant ID 1299439:** The energy efficiency project was an interior LED lighting retrofit with a small number of exterior lighting retrofits and a window film installation at a religious facility. During the desk review, the EM&V team adjusted the exterior lighting type from *religious worship* to *outdoor: dusk to dawn*. One LED lighting fixture was adjusted from 40.5 W to 41.5 W, and another was adjusted from 10.0 W to 41.0 W based on the certification. A third lamp type was adjusted to *non-qualified* because the EM&V team could not identify the certification. In addition to the lighting adjustment, the EM&V team changed the baseline shading coefficient for the window replacement to better match the pre-install painted condition. Overall, these adjustments reduced peak demand savings and energy savings and resulted in realization rates of 87 percent kilowatt and 90 percent kilowatt-hour.

**Participant ID 1299450:** The energy efficiency project was an interior and exterior LED lighting retrofit of a convenience store with a 24-hour operation. During the desk review, the EM&V team adjusted the building type from *custom* to *food sales: 24-hour supermarket or convenience store*. The consumption of four LED lighting fixtures was adjusted to match the appropriate third-party lighting certification. These adjustments slightly increased peak demand savings and decreased energy savings and resulted in realization rates of 101 percent kilowatt and 98 percent kilowatt-hour.

## Documentation Score

Partial documentation was provided for three of the four projects. The final calculator was provided for all four projects; however, the pre-calculators and post-calculators were not provided on three projects. Three projects lacked certification documentation, and two projects lacked sufficient invoices for all the equipment installed. This year, the post-install inspection notes were not consistently provided. Complete documentation enhances the accuracy and transparency of project savings, along with ease of evaluation. Typical documentation needed includes invoices; QPL qualifications and Air Conditioning, Heating, and Refrigeration Institute (AHRI) certifications; pre-inspection and post-inspection notes; project savings calculators; and photographic documentation of existing and new equipment. Overall, the EM&V team assigned a program documentation score of *fair*.

### 10.3.2 Retro-Commissioning Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
10.7%	1,248	1,248	100.0%	27.0%	6,919,253	6,917,092	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 PY2020 Retro-Commissioning MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for two projects. The projects had adjustments of less than five percent compared to the originally claimed savings. Xcel SPS accepted the evaluated results but did not match the claimed savings to those of the evaluations. The final program realization rate is nearly 100 percent. Further details of the EM&V findings are provided below.

**Participant ID 1313916:** The energy efficiency project included an interior and exterior LED lighting retrofit at a retail vehicle location. During the desk review, the EM&V team adjusted lighting wattages for one fixture based on the DLC QPL. The adjustment was for rounding to the nearest half-watt, from 79.0 W claimed to 78.5 W. This adjustment increased the peak demand savings and energy savings slightly, but the realization rate remained 100 percent for kilowatt and kilowatt-hour.

**Participant ID 1313921:** The energy efficiency project included the replacement of 58 HVAC rooftop units with high-efficiency direct expansion (DX) air-cooled units at various schools within a school district. Also, the project included an interior LED lighting retrofit at multiple schools, public assembly spaces, and administrative facilities within the school district. During the desk review, the EM&V team adjusted the lighting quantities based on the post-inspection notes. The ex-ante savings calculation adjusted the calculator for some post-inspection notes, but not all of them. Overall, the adjustments reduced the peak demand and energy savings by about a half percent and resulted in rounded realization rates of 100 percent kilowatt and kilowatt-hour.

#### Documentation Score

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



# 10.4 DETAILED FINDINGS—RESIDENTIAL

## 10.4.1 Residential Smart Thermostat Market Transformation Program (MTP)

Program contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
0.0%	0	0	N/A	1.0%	250,063	250,063	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 PY2020 Residential Smart Thermostat MTP evaluation efforts focused on a documentation review. There were no savings adjustments made for this program.

### Documentation Score

Due to the nature of the midstream program delivery, documentation requirements differ from that of an SOP. Typical tracking and documentation for midstream programs can include but are not limited to monthly store invoices, aggregate customer data, quantity purchased, and model numbers of purchased measures. Xcel SPS provided aggregate customer data, including order numbers, quantity purchased, rebates paid, SKU numbers, and model numbers. The EM&V team determined that Xcel SPS provided sufficient documentation for the Residential Smart Thermostat MTP. Overall, the EM&V team assigned a program documentation score of *good*.

# 10.5 DETAILED FINDINGS—LOAD MANAGEMENT (MEDIUM EVALUATION PRIORITY)

## 10.5.1 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
42.2%	4,922	4,922	100.0%	0.3%	78,720	78,716	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 Xcel SPS Load Management SOP by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments at the meter level. Load management events in PY2020 occurred on the following dates and times:

- June 30, 2020, from 2:00 p.m. to 6:00 p.m. (unscheduled),
- July 09, 2020, from 4:00 p.m. to 8:00 p.m. (unscheduled),
- July 10, 2020, from 4:00 p.m. to 8:00 p.m. (unscheduled), and
- July 13, 2020, from 4:00 p.m. to 8:00 p.m. (unscheduled).

The EM&V team received the interval meter data and a spreadsheet that summarized the event-level savings for the nine sponsors across 17 sites. Two sites did not have any load data associated with them for two of the four events, and six sites did not have any load data related to them for one of the four events. All sponsors had at least one participating site that participated in at least one event.

To calculate savings at the site level, Xcel SPS averaged the kilowatt reductions for each site, whether or not the site participated in both events. The kilowatt-hour savings were calculated by adding the achieved kilowatt savings and multiplying them by the total number of event hours. In applying this method to the meter-level data and following the TRM, the EM&V team calculated kilowatt and kilowatt-hour savings that matched Xcel SPS's; therefore, no adjustments were made to the program savings. A negligible difference in kilowatt-hour is attributed to rounding practices during calculations. The table above shows both the EM&V team (evaluated) and Xcel SPS' (claimed) calculated kilowatt and kilowatt-hour savings.

Evaluated savings for the Xcel SPS Load Management SOP are 4,922 kW and 78,716 kWh. The realization rate for both kilowatt and kilowatt-hour is 100 percent, with a documentation score of *good*.

## 10.6 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 51 summarizes claimed savings for Xcel SPS's programs in PY2020 that only received a tracking system review for program impacts. The programs' claimed savings were verified against the final PY2020 tracking data provided to the EM&V team for the EM&V database.

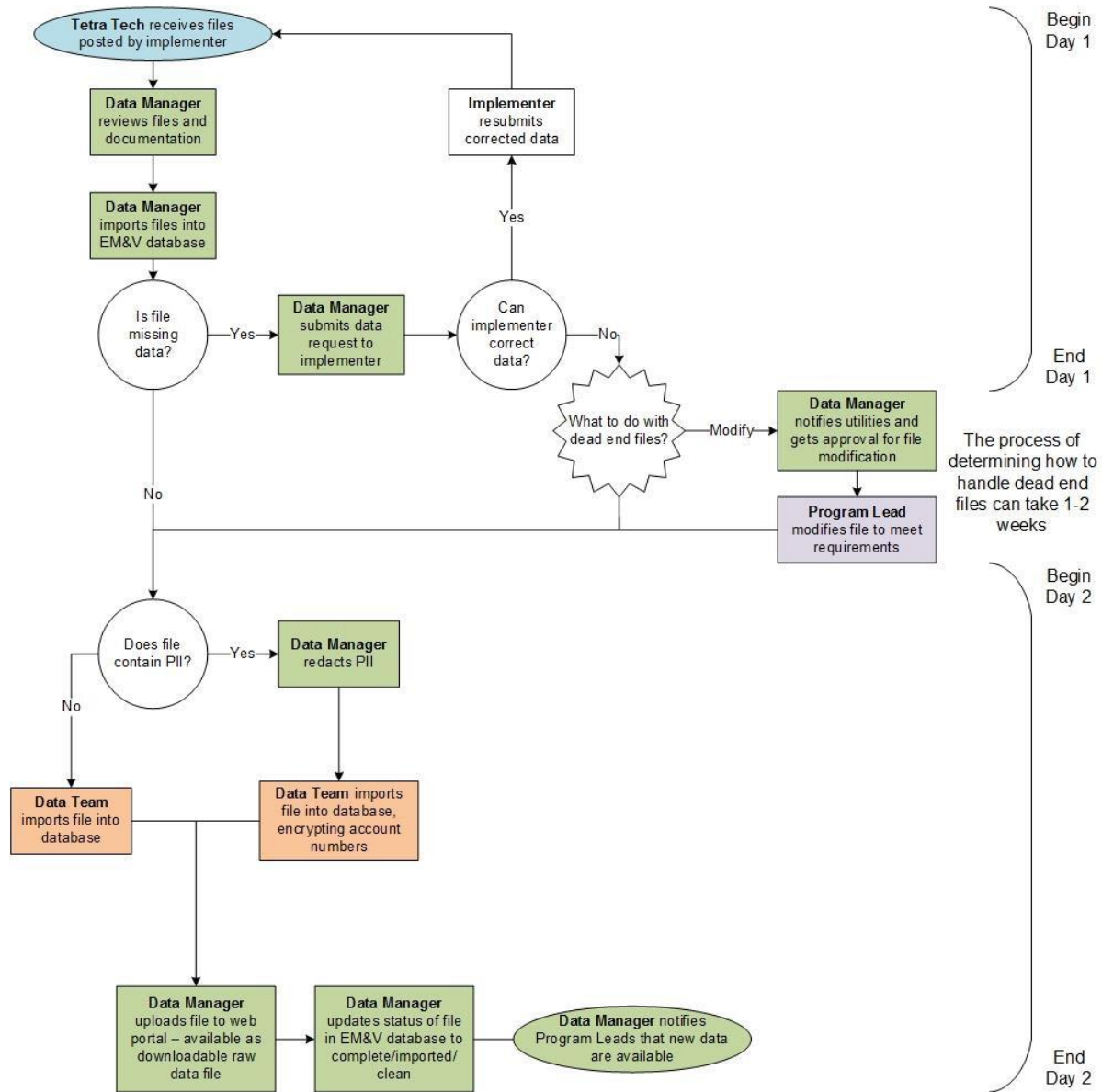
**Table 51. PY2020 Claimed Savings (Tracking-System-Only Evaluated Programs)**

Program	Contribution to portfolio savings (kW)	Claimed demand savings (kW)	Evaluated demand savings (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Residential SOP	8.3%	972	972	100.0%	8.4%	2,166,145	2,166,145	100.0%
Small Commercial MTP	1.4%	160	160	100.0%	2.9%	735,176	735,176	100.0%
Home Lighting MTP (Commercial)	20.7%	2,413	2,413	100.0%	31.8%	8,159,151	8,159,151	100.0%
Home Lighting MTP (Residential)	3.4%	396	396	100.0%	7.9%	2,021,574	2,021,574	100.0%
Hard-to-Reach SOP	5.9%	687	687	100.0%	5.9%	1,501,333	1,501,333	100.0%
Low-Income Weatherization	2.5%	295	295	100.0%	3.1%	805,886	805,886	100.0%
Refrigerator Recycling MTP	0.1%	14	14	100.0%	0.4%	108,288	108,288	100.0%

# APPENDIX A: DATA MANAGEMENT PROCESS

Figure 3 details the data management process.

**Figure 3. Data Management Process**



## APPENDIX B: COST-EFFECTIVENESS CALCULATIONS

This appendix describes the calculations used for modeling cost-effectiveness. This approach provides the 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.<sup>14</sup> 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.

<sup>14</sup> 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 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 52 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 52. Average Energy Cost by Utility**

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

### B.3 NET-TO-GROSS RATIOS

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

**Table 53. Net-to-Gross Ratios**

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



## APPENDIX C: QUALITY ASSURANCE/QUALITY CONTROL PROTOCOLS

This appendix documents the 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