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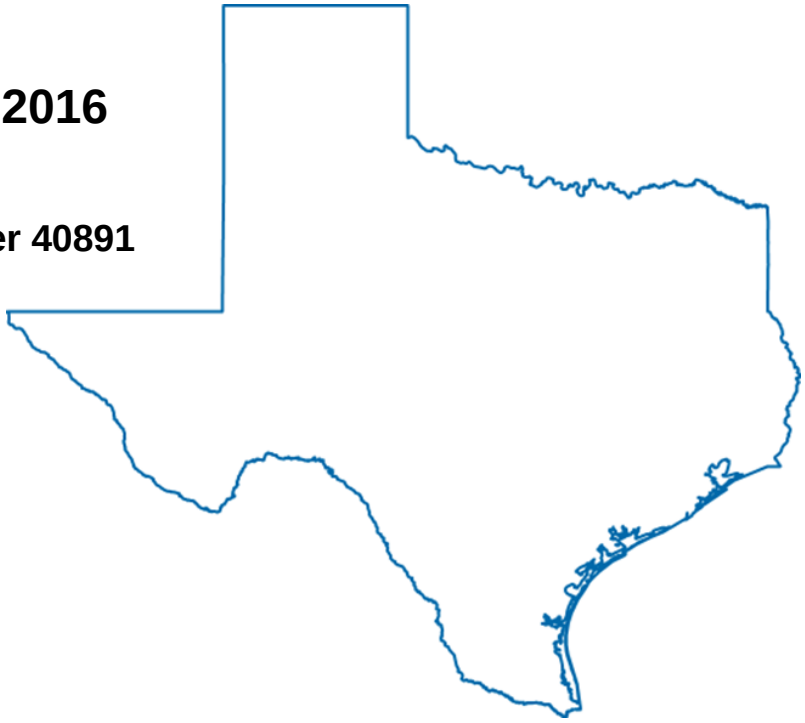
Public Utility Commission of Texas

Annual Statewide Portfolio Report for Program Year 2015—Volume II

August 15, 2016

Project Number 40891



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Public Utility Commission of Texas

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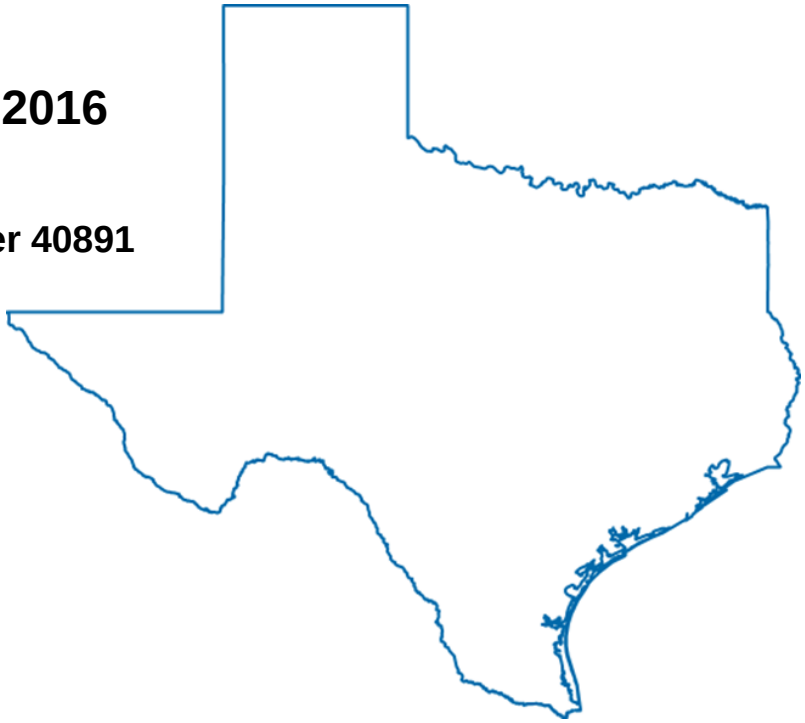

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Acknowledgements

This document was developed as a collaborative effort among Tetra Tech, The Cadmus Group, Itron, Johnson Consulting Group, Texas A&M University, and Texas Energy Engineering Services, Inc. under the leadership of Tetra Tech.

We would like to acknowledge the many individuals who contributed to the Evaluation, Measurement, and Verification (EM&V) of Program Year 2015. This evaluation effort would not have been possible without their assistance and support.

Public Utility Commission of Texas and electric utility staff provided input throughout the evaluation processes. The following individuals participated in ongoing evaluation deliverable reviews and discussions, attended multiple meetings, and responded to follow-up questions and program data and documentation requests:

- Public Utility Commission of Texas: Katie Rich and Therese Harris
- American Electric Power Texas: Pam Osterloh, Robert Cavazos and Russell Bego
- CenterPoint: Cheryl Bowman, Kristy Hardy, Yolanda Slade and Stephen Bezecy
- El Paso Electric: Susanne Stone and Araceli Perea
- Entergy: Kelley Carson, Phil Lanier and Mike Snyder
- Oncor: Mike Baker, Garry Jones, Joseph Nixon, Mike Stockard, and Amanda Townsend
- Sharyland: Bridget Headrick and Alicia Rigler
- SWEPCO: Debra Miller and Paul Pratt, and Jeff Thigpen
- TNMP: Stefani Case and Ashley Mitchell
- Xcel SPS: Michael Pascucci, Derek Shockley and Brian Whitson.

We also wish to thank staff at the following utility consulting firms who provided program data and documentation and insight into program implementation: CLEAResult, DNV KEMA, Ecova, Frontier Associates, ICF International, JACO Environmental, Nexant, Resource Action Programs, and Willdan Energy Solutions.

EM&V team primary report contributors include:

Firm	Contributor	Role
Tetra Tech	Lark Lee	Overall project manager and technical reviewer
	Jonathan Hoechst	Evaluation Planning and Reporting lead
	Dan Belknap	Cost-effectiveness testing and data lead
	Sue Hanson and Rich Hasselman	Residential market transformation programs
	Kim Baslock, Jeff Brooks, and Chris King	Nonresidential market transformation programs
The Cadmus Group	Steve Cofer and Paul Youchak	Residential standard offer programs
	Scott Reeves and Natalie Bodington	Low-income/hard-to-reach programs
Itron	Bob Ramirez, Ben Cheah, and Phani Pagadala	Commercial standard offer programs
	Dave Hanna and Molly Du	Load management programs
	Stephan Barsun	Solar PV programs

Please send any questions or comments on the report to Katie Rich (katie.rich@puc.gov.tx) and Lark Lee (lark.lee@tetratech.com).

Acronyms

AC	Air conditioner
AEP TCC	American Electric Power Texas Central Company
AEP TNC	American Electric Power Texas North Company
CF	Coincidence factor
C&I	Commercial and industrial
CMTP	Commercial Market Transformation Program
CNP	CenterPoint Energy Houston Electric, LLC
CSOP	Commercial Standard Offer Program
DHP	Ductless heat pump
DI	Direct install
ECM	Energy conservation measure
EECRF	Energy Efficiency Cost Recovery Factor
EEIP	Energy Efficiency Implementation Project
EEPR	Energy Efficiency Plan and Report
EESP	Energy efficiency service provider
EISA	Energy Independence and Security Act of 2007
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
EM&V	Evaluation, measurement, and verification
EUMMOT	Electric Utility Marketing Managers of Texas
GSHP	Ground-source heat pump
HCIF	Heating/cooling interactive factor
HOU	Hours of use
HPwES	Home Performance with ENERGY STAR®
HTR	Hard-to-reach
HVAC	Heating, ventilation, and air conditioning
IECC	International Energy Conservation Code

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

1. IMPACT EVALUATION RESULTS—AMERICAN ELECTRIC POWER TEXAS CENTRAL COMPANY

This section presents the evaluated savings and cost-effectiveness results for AEP TCC's 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 only verified through the EM&V Database are included.

1.1 KEY FINDINGS

1.1.1 Evaluated savings

AEP TCC's evaluated savings for PY2015 were 43,933 in demand (kW) and 69,456,702 in energy (kWh) savings. The overall kW and kWh portfolio realization rates were slighty above 100 percent The residential sector accounts for the slightly higher kW savings while both commercial and residential sector adjustments account for the slightly higher kWh savings.

Table 1-1 shows the claimed and evaluated demand reduction for AEP TCC's portfolio and broad customer sector/program categories for PY2015.

Table 1-1. AEP TCC Program Year 2015 Claimed and Evaluated Gross Demand Reduction

Level of Analysis	Percent Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	2015 Evaluated Demand Reduction (kW)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**43,775**	**43,933**	**100.4%**	**0.0%**
Commercial Sector	18.4%	8,053	8,052	100.0%	0.1%
Residential Sector	18.9%	8,288	8,446	101.9%	0.0%
Load Management*	62.6%	27,418	27,418	100.0%	N/A
Pilots	<0.05%	17	17	100.0%	0.0%

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

Table 1-2 shows the claimed and evaluated energy savings for AEP TCC's portfolio and broad customer sector/program categories for PY2015.

Table 1-2. AEP TCC Program Year 2015 Claimed and Evaluated Gross Gross Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)	2015 Evaluated Energy Savings (kWh)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**68,482,226**	**69,456,702**	**101.4%**	**0.8%**
Commercial Sector	57.0%	39,063,321	39,474,820	101.1%	1.4%
Residential Sector	42.8%	29,329,483	29,892,460	101.9%	0.0%
Load Management*	<0.05%	27,418	27,418	100.0%	N/A
Pilots	0.1%	62,004	62,004	100.0%	0.0%

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

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

In program-level realization rates, we have also included a program documentation score of good, fair, or limited as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent–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 score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs and/or high savings programs have been identified. AEP TCC received a good kW program documentation score and a good kWh program documentation score for PY2015.[1] As program documentation recommendations from the PY2013 EM&V effort are to come into effect in PY2015, the EM&V team did expect program documentation scores to improve between PY2013 and PY2015, which AEP fully complied with.

1.1.2 Cost-effectiveness results

AEP TCC's overall portfolio had a cost-effectiveness of 2.57, or 2.80 excluding low-income programs.

[1] In PY2015, only high and medium priority programs received documentation scores. Therefore, overall documentation scores are based only on high and medium priority programs.

The more cost-effective programs were SMART Source Solar PV MTP (Commercial)[2], Commercial Solutions MTP, and Commercial SOP. The less cost-effective programs were Open MTP and SMART Source Solar PV MTP (Residential). The Efficiency Connection Pilot MTP is not required to pass cost-effectiveness testing as it is in its first year of operation. The lifetime cost of PY2015 evaluated savings was $0.012 per kWh and $18.55 per kW.

Table 1-3. AEP TCC Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	**2.52**	**2.57**	**2.19**
Total Portfolio excluding low-income programs	**2.74**	**2.80**	**2.38**
Commercial	**3.15**	**3.17**	**2.73**
Commercial Solutions MTP	3.86	3.83	3.26
Commercial SOP	3.41	3.50	2.79
CoolSaver A/C Tune-Up MTP	1.90	1.90	1.52
Open MTP	1.23	1.23	1.11
SCORE/CitySmart MTP	3.14	3.14	2.92
SMART Source Solar PV MTP	25.44	25.44	25.69
Residential	**2.46**	**2.57**	**2.10**
CoolSaver A/C Tune-Up MTP	1.29	1.29	1.03
High Performance New Homes MTP	1.41	1.42	0.99
Residential SOP	3.23	3.32	2.59
SMART Source Solar PV MTP	1.06	1.06	1.01
Hard-to-Reach SOP	2.27	2.61	2.61
Low Income	**1.40**	**1.27**	**1.27**
Targeted Low-Income Energy Efficiency Program	1.40	1.27	1.27
Load Management	**2.24**	**2.24**	**2.24**
Load Management SOP	2.24	2.24	2.24
Pilot	**0.42**	**0.42**	**0.42**
Efficiency Connection Pilot MTP	0.42	0.42	0.42

[2] Due to policy changes starting in 2016 for utilities to claim savings over incentive caps, Solar PV cost-effectiveness will likely decrease as one large project with substantial savings over the incentive cap is a primary driver of the high PV cost-effectiveness.

1.2 DETAILED FINDINGS—COMMERCIAL (HIGH/MEDIUM EVALUATION PRIORITY)

1.2.1 Commercial Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	5.1%	2,233	2,233	100.0%
Energy Savings (kWh)	21.7%	15,036,669	15,501,753	103.1%

Completed Desk Reviews*	On-site M&V
17	10

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 CSOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made an adjustment to the claimed savings for one project. This project resulted in an adjustment of greater than five percent and further details are provided below.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID #857808: During the desk review and on-site M&V visit of this lighting project, the EM&V team found a tracking data error. The claimed savings within the tracking data was not reflective of final project savings or documentation. The EM&V team was able to confirm the final calculators provided were correct from a content perspective and reflective of pre/post inspection findings. The EM&V team also found the CUSTOMLED3 fixture was DLC-certified at 50 watts and not 49 watts as claimed. The CUSTOMLED4 fixture could not be verified, as no model number or other specifications were provided. Based on these findings, the EM&V team updated the project savings, which resulted in an increase in the evaluated energy savings and no change in evaluated demand reduction from the reported savings. These findings increased overall energy savings resulting in 151 percent kWh and 100 percent kW realization rates.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for 14 of the 17 projects that had desk reviews completed because sufficient documentation was provided. In particular, projects that had incomplete documentation, included one lighting project that had a missing model number and specifications for a custom LED. For two other projects, the final calculators were

omitted. As sufficient documentation was provided for 82 percent of the sampled sites, the program documentation score for these estimates is Fair.

1.2.2 Commercial market transformation

A. Commercial Solutions Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	2.7%	1,185	1,185	99.9%
Energy Savings (kWh)	9.8%	6,719,171	6,665,586	99.2%

Completed Desk Reviews*	On-site M&V
9	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.

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made several adjustments to the claimed savings for five projects. Two projects resulted in adjustments of less than five percent and three projects had adjustments of greater than five percent and for whom further details are provided below.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID #864435: This site had both HVAC and Roofing projects. During the initial desk review, the EM&V team found the HVAC component of the sites project had inadequate justification to support the custom assumptions that were key drivers of the project savings. Following a second data collection effort, the implementer provided further details to support a custom facility coincidence factor and hours of operation. The new savings were estimated using an eQUEST model and TMY3 weather data. Based on these results, the EM&V team updated the project savings, which resulted in an 46 percent decrease in the evaluated energy savings and eight percent decrease in demand reduction as compared to the original reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which ultimately resulted in a 100 percent realization rate for the project's energy savings and demand reduction. This site did not receive an on-site M&V visit.

Project ID #865336: This site had Lighting, HVAC, and Roofing projects. During the desk review, the EM&V team found the Roofing component of the sites project had key

assumptions that required correction. In particular, the HVAC system size was adjusted from a total of 155 tons to 150.5 tons. Also, the project documents indicated that the new roofing materials were laid upon the old roof materials which had an R-value of 1.9. However, these were omitted in the ExAnte calculations. Lastly, the solar reflectivity was claimed at 86 for the new roof, yet the Duro-Last DL40 has an initial reflectivity of 86, but a 3-year reflectivity of only 68. Based on these results, the EM&V team updated the project savings for the Roofing portion of the project, which resulted in an 48 percent decrease in the evaluated energy savings and 44 percent decrease in demand reduction as compared to the original reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which ultimately resulted in a 100 percent realization rate for the project's energy savings and demand reduction. This site did not receive an on-site M&V visit.

Project ID #846245: This site had both Lighting and HVAC projects. During the desk review, the EM&V team found the EER rating for the project's DX AC unit reported in the ACE calculator tool was 12. This was different from that described within the AHRI certifications (EER equal to 12.1) provided within the project documentation and assessed as part of the desk review. These findings increased energy savings and demand reduction for the HVAC component (kWh and kW realization rates equal to 105 percent). The sites total savings increased slightly resulting in an overall energy savings realization rate of 101 percent kWh and overall demand reduction realization rate of 102 percent kW. This site did not receive an on-site M&V visit.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for eight of the nine projects that had desk reviews completed because sufficient documentation was provided for the sites. In particular, one project that had incomplete documentation, was missing full verification of a roofs key parameters such as roof size, HVAC loads, solar reflectance, and scope of the old roofing material removal. As sufficient documentation was provided for 89 percent of the sampled sites, the program documentation score for these estimates is Fair.

B. SCORE/CitySmart Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	3.0%	1,333	1,333	100.0%
Energy Savings (kWh)	10.3%	7,159,107	7,159,107	100.0%

Completed Desk Reviews*	On-site M&V
5	2

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 SCORE/CitySmart MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made no adjustments to any of the savings calculations for the projects reviewed. Therefore, evaluated savings were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for five of the five projects that had desk reviews completed because sufficient documentation was provided. Since sufficient documentation was provided for 100 percent of the sampled projects, the program documentation score for these estimates is Good.

1.3 DETAILED FINDINGS—RESIDENTIAL (HIGH/MEDIUM PRIORITY EVALUATION)

1.3.1 Residential standard offer

A. Residential Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	10.8%	4,735	4,759	100.5%
Energy Savings (kWh)	25.5%	17,465,758	17,500,689	100.2%

Completed Desk Reviews*	On-site M&V
0	0

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

Evaluated savings for the AEP TCC RSOP were 4,759 kW and 17,500,689 kWh, with realization rates of 101 percent and 100 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made through the data review process: checking that tracking system data are aligned with deemed savings in the technical reference manual.

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data review realization rates are provided below.

i. Data review

The data review realization rates are 100 percent for energy savings and 101 percent for demand reduction. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates of approximately 100 percent indicates that the program tracking data analysis is consistent with the measure analysis in the TRM. The minor difference reflected in the data review realization rate is driven by a few factors.

Air infiltration eligibility requirements. TRM V2.1 contains several eligibility requirements for the infiltration reduction measure, the application of which led to a difference in reported and evaluated savings for one measure. The TRM applies a cap to the pre-treatment infiltration against which contractors can claim savings.[3] For homes where the initial leakage exceeds 4.0 CFM_{50} per square foot, this cap is to be treated as the starting leakage. The TRM also requires that contractors reduce air leakage by at least 10 percent through implementation of this measure, with this requirement measured relative to the initial leakage cap where applied.

For the AEP TCC Residential Standard Offer Program, eight projects reported savings that did not meet the 10 percent air leakage reduction requirement. For these projects, the EM&V team assigned zero savings. Additionally, one project reported negative savings due to the post-retrofit air leakage exceeding the pre-retrofit leakage cap. In this case, the EM&V team applied zero savings. These discrepancies lowered the realization rate, however the impact was outweighted by factors which increased the realization rate overall.

***Ex ante* listed as zero.** For a small number of measures the ex-ante value was listed as zero, however the EM&V team was able to calculate savings for the measure based on the tracking data provided. This affected four duct sealing, seven air infiltration, and one ceiling insulation projects and resulted in an increase in the realization rate.

Heating system type. The team identified savings discrepancies for six air infiltration projects and two duct sealing projects due differences in heating system type used in the savings calculations compared to the type reported in the tracking system. The overall effect was a slight increase in the energy realization rate.

Ceiling insulation measure R-values. In the case of four ceiling insulation projects, the team identified discrepancies based on differences in R-values used in the savings cacluations compared to those reported in the tracking system. This resulted in an increase in the realization rate.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. All rounding discrepancies were found in the duct sealing measure category, which indicated rounding differences of up to 0.004 kW per measure and within 0.5 kWh. This did not significantly impact the realization rate.

Minor calculation differences. The team observed an additional minor divergence in energy savings for two wall insulation measures. While ex post energy impacts were lower for these two measures, the impact of this discrepancy on the program-level results was negligible.

[3]The deemed savings awarded for this measure are not considered to vary linearly with leakage above the level of the cap, and since few homes have such high initial leakage the cap also serves to prevent data entry errors.

B. Hard-to-Reach Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	2.8%	1,224	1,374	112.3%
Energy Savings (kWh)	6.5%	4,456,145	5,096,193	114.4%

Completed Desk Reviews*	On-site M&V
0	0

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

Evaluated savings for the AEP TCC Hard-to-Reach SOP were 1,374 kW and 5,096,193 kWh, with realization rates of 112 percent and 114 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made through the data review: checking that tracking system data are aligned with deemed savings in the technical reference manual.

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data review realization rates are provided below.

i. Data review

The data review realization rates are 114 percent for energy savings and 112 percent for demand reduction. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rate is higher than 100 percent, indicating that the program tracking data analysis is inconsistent with the measure analysis in the TRM in several cases. The difference reflected in the data review realization rate is driven by a few factors.

Ducting efficiency, pre-leakage cap. TRM V2.1 contains limitations for the duct efficiency improvement measure, the application of which led to a difference in reported and evaluated savings for several measures. For standard offer programs, the TRM applies a cap to the initial leakage rate against which contractors can claim savings. For homes with an initial leakage rate greater than 35 percent of total fan flow, savings are awarded with respect to

this cap rather than the initial leakage. Hard-to-reach programs are not required to apply this initial leakage cap.

For the AEP TCC Hard-to-Reach Standard Offer Program, 562 projects reported savings based on a calculation in which the pre-treatment duct leakage cap was triggered and applied. The EM&V team awarded savings based on the removal of the pre-treatment leakage cap. These changes resulted in a significant increase in the realization rate and were the main driver affecting the realization rates.

Air infiltration eligibility requirements. TRM V2.1 contains several eligibility requirements for the infiltration reduction measure, application of which led to a difference in reported and evaluated savings for several measures. The TRM applies a cap to the pre-treatment infiltration against which contractors can claim savings, however hard-to-reach and low income programs are exempt from this pre-treatment infiltration cap.[4] For homes where the initial leakage exceeds 4.0 CFM_{50} per square foot, this cap is to be treated as the starting leakage. The TRM also requires that contractors reduce air leakage by at least 10 percent through implementation of this measure, with this requirement measured relative to the initial leakage cap where applied.

For the AEP TCC Hard-to-Reach Standard Offer Program, two projects reported savings based on a calculation in which the pre-treatment infiltration cap was triggered and applied. The EM&V team awarded savings based on the removal of the pre-treatment infiltration cap. These changes resulted in a small increase in the realization rate.

***Ex ante* listed as zero.** For a small number of projects (eight duct sealing and 16 air infiltration projects), the ex-ante value was listed as zero, however the EM&V team was able to calculate savings for the measure based on the tracking data provided. These changes resulted in a small increase in the realization rate.

Heating system type. The team identified savings discrepacnies for seven air infiltration projects and three duct sealing projects due to differences in the heating system type used in the savings calculation compared to the type reported in the tracking system. This resulted in a small increase in the realization rate.

CFL winter demand reduction. TRM V2.1 specifies an approach for estimating both summer and winter peak usage, and guidance for claiming those savings representing the higher impacts between the two seasons. There were several instances where the EM&V team found the winter peak demand reduction to be larger than the summer peak demand reduction, despite the claimed savings reporting the summer kW. The EM&V team has reported the greater of the two values. This did not significantly impact the realization rate.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. All rounding discrepancies were found in the duct sealing measure category, which indicated rounding differences of up to 0.005 kW per measure and within 0.5 kWh. This did not significantly impact the realization rate.

[4] The deemed savings awarded for this measure are not considered to vary linearly with leakage above the level of the cap, and since few homes have such high initial leakage the cap also serves to prevent data entry errors.

Minor calculation differences. The team observed an additional minor divergence in energy savings for five wall insulation projects and two duct sealing projects that may stem from data input or calculation errors. The impact of these discrepancies is small, however, and does not appear to indicate any systematic error. This did not significantly impact the realization rate.

1.3.2 Residential market transformation

A. High-Performance New Homes Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	1.1%	501	501	100.0%
Energy Savings (kWh)	2.8%	1,903,959	1,903,959	100.0%

Completed Desk Reviews*	On-site M&V
4	0

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

Evaluated savings for AEP TCC's High-Performance New Homes MTP were the same as the claimed savings; thus, realization rates for both kW and kWh are 100 percent.

The tracking system did not identify any issues for concern. In order to complete a comprehensive desk review for this program, the EM&V team requested all project documentation associated with each sampled project, including reports of QA/QC or M&V activity if conducted, documentation for how the as-built home compares to the base home, and modeling and energy savings information.

For PY2015, the EM&V team received a REM/Rate[5] file and Fuel Summary Report for each sampled project. In the past, the EM&V team has also received a DOE-2[6] SIM file for each sampled project but did not receive those this year. We were able to receive the implementer's rated and reference home inputs in an Excel file, which provided additional insight into the modeling process. While we were able to create a REM/Rate baseline home

[5] REM/Rate is a residential energy analysis, code compliance, and rating software developed specifically for the needs of Home Energy Rating System (HERS) providers. REM/Rate™ software calculates heating, cooling, hot water, lighting, and appliance energy loads, consumption and costs for new and existing single and multi-family homes. (www.archenergy.com/products/remrate).

[6] DOE-2 is a widely used and accepted freeware building energy analysis program that can predict the energy use and cost for all types of buildings. DOE-2 uses a description of the building layout, constructions, usage, conditioning systems (lighting, HVAC, etc.) and utility rates provided by the user, along with weather data, to perform an hourly simulation of the building and to estimate utility bills. The "SIM" file is a file type (similar to "PDF" or "DOC"). http://doe2.com/DOE2/.

file and compared the sampled REM/Rate files to that base home, the DOE-2 file would have allowed the EM&V team to be able to compare end uses and provided insight into an interim step in the Beacon modeling process, making our analysis more robust.

Across the four desk reviews the EM&V team completed, we did see slight variation in realization rates when assessing only the REM/Rate files (88 percent, on average). Some of this variation could be related to the fact that we do not have access to the Beacon modeling tool in its entirety. However, the EM&V team's attempts at reproducing this program's results come very close, resulting in an overall realization rate of 100 percent for both kW and kWh.

Because the implementer for this program leverages an M&V methodology for calculating savings on a per home basis, the EM&V team worked with both AEP TCC and the implementer to finalize an M&V methodology that was included with Texas TRM 3.0, Volume 4.

Because sufficient supporting documentation for all sampled homes was received, the program documentation score is Good.

1.4 DETAILED FINDINGS—LOAD MANAGEMENT (HIGH/MEDIUM PRIORITY EVALUATION)

1.4.1 Load Management Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	62.6%	27,418	27,418	100.0%
Energy Savings (kWh)	0.0%	27,418	27,418	100.0%

Completed Desk Reviews*	On-site M&V
0	0

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

The EM&V team evaluated the PY2015 AEP TCC Load Management Standard Offer Program by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15 minute increments at the ESIID level. Four load management events occurred during PY2015:

- July 13, 2015 from 1 p.m. to 2p.m. and 4 p.m. to 5 p.m. for one participant
- July 13, 2015 from 4 p.m. to 5 p.m.
- August 28, 2015 from 3 p.m. to 4 p.m.
- August 31, 2015 from 1 p.m. to 2 p.m.

There were 31 participants all who participated in one event. Using the meter data provided for all participants, the EM&V team applied the TRM methodology to calculate participant level savings and total program savings. During this process, the EM&V team confirmed with TCC that there was one participant which participated in an event during a different time (as reflected in the list above).The EM&V team found that the participant level and total savings matched the savings reported by TCC in kW. The EM&V team additionally calculated kWh savings which also matched savings reported by TCC.

Evaluated savings for the AEP TCC Load Management SOP are 27,418 kW and 27,418 kWh. The realization rate for kW is 100 percent and the realization rate for kWh is also 100 percent.

1.5 SUMMARY OF LOW PRIORITY EVALUATION PROGRAMS

Table 1-4 provides a summary of claimed savings for AEP TCC's low evaluation priority programs in PY2015, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2015 tracking data provided to the EM&V team for the EM&V Database.

Table 1-4. PY2015 Claimed Savings (Low Evaluation Priority Programs)

Program	Program Contribution To Portfolio Savings (kW)	2015 Claimed Demand Reduction (kW)	Program Contribution To Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)
Open MTP	1.6%	679	4.5%	3,059,520
CoolSaver℠ A/C Tune-Up MTP (COM)	3.6%	1,593	7.5%	5,104,501
SMART Source℠ Solar PV MTP (COM)	2.4%	1,029	2.9%	1,984,354
CoolSaver℠ A/C Tune-Up MTP (RES)	2.4%	1,051	5.8%	3,997,053
SMART Source℠ Solar PV MTP (RES)	0.3%	144	0.4%	278,032
Targeted Low-Income Energy Efficiency Program	1.4%	633	1.8%	1,228,536
Efficiency Connection Pilot MTP	0.0%	17	0.1%	62,004

1.5.1 Low Income Weatherization

A. Data review

The data review realization rates are 97 percent for demand and 91 percent for energy savings. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are 97 percent for demand and 91 percent for energy savings, indicating that the program tracking data is somewhat consistent with the values in the TRM. However, several minor factors led to small differences between tracking and evaluated savings.

Refrigerators. TRM V2.1 specifies that in order to calculate refrigerator savings for early retirement the annual energy consumption of the replaced unit is required. This information was not provided in the utilty tracking data for this program and could not be used to calculate savings. For this reason, the team estimated ex-post savings based on calculations for replace on burnout measures. This results in a low realization rate for refrigerator measures.

Minor calculation differences. The team observed additional minor divergences in energy savings and demand reduction for window AC and heat pump measures that may stem from data input or calculation errors. The impact of these discrepancies is small, however, and does not appear to indicate any systematic error.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. With the exception of duct sealing measures, which indicated rounding differences of up to 0.005 kW per measure, all identified variations due to rounding were within 1 kWh and 0.001 kW.

2. IMPACT EVALUATION RESULTS—AMERICAN ELECTRIC POWER TEXAS NORTH COMPANY

This section presents the evaluated savings and cost-effectiveness results for AEP TCC's 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 only verified through the EM&V Database are included.

2.1 KEY FINDINGS

2.1.1 Evaluated savings

AEP TNC's evaluated savings for PY2015 were slightly more than claimed savings at 4,649 in demand (kW) and 13,143,955 in energy (kWh) savings. The overall kW portfolio realization rate is 102.4 percent, while the overall kWh portfolio realization rate is 102.9 percent. Realization rates are above 100 hundred percent primarily due to residential claimed savings tracking system adjustments.

Table 2-1 shows the claimed and evaluated demand reduction for AEP TNC's portfolio and broad customer sector/program categories for PY2015.

Table 2-1. AEP TNC Program Year 2015 Claimed and Evaluated Gross Demand Reduction

Level of Analysis	Percent Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	2015 Evaluated Demand Reduction (kW)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**4,542**	**4,649**	**102.4%**	**0.1%**
Commercial Sector	34.5%	1,566	1,571	100.3%	0.4%
Residential Sector	27.0%	1,227	1,311	106.9%	0.0%
Load Management	38.4%	1,744	1,762	101.0%	N/A
Pilots	0.1%	5	5	100.0%	0.0%

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

Table 2-2 shows the claimed and evaluated energy savings for AEP TNC's portfolio and broad customer sector/program categories for PY2015.

Table 2-2. AEP TNC Program Year 2015 Claimed and Evaluated Gross Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)	2015 Evaluated Energy Savings (kWh)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**12,289,271**	**12,649,387**	**102.9%**	**0.6%**
Commercial Sector	70.0%	8,597,212	8,656,071	100.7%	1.6%
Residential Sector	29.8%	3,663,410	3,964,659	108.2%	0.0%
Load Management	0.1%	6,252	6,259	100.1%	N/A
Pilots	0.2%	22,397	22,397	100.0%	0.0%

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

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

In program-level realization rates, we have also included a program documentation score of good, fair, or limited as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent–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 score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs and/or high savings programs have been identified. AEP TNC received a good kW program documentation score and a good kWh program documentation score for PY2015.[7] As program documentation recommendations from the PY2013 EM&V effort are to come into effect in PY2015, the EM&V team did expect program documentation scores to improve between PY2013 and PY2015.

2.1.2 Cost-effectiveness results

AEP TNC's overall portfolio had a cost-effectiveness of 2.66, or 2.92 excluding low-income programs.

The more cost-effective programs were Commercial SOP and Residential SOP. The less cost-effective programs were Smart Source[SM] Residential Solar MTP and Load Management

[7] In PY2015, only high and medium priority programs received documentation scores. Therefore, overall documentation scores are based only on high and medium priority programs.

SOP. All of AEP TNC's programs passed cost effectiveness except for the Efficiency Connection Pilot MTP, which was not required to pass since it is in its first year of operation.

The lifetime cost of PY2015 evaluated savings was $0.012 per kWh and $17.62 per kW.

Table 2-3. AEP TNC Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	**2.48**	**2.66**	**2.31**
Total Portfolio excluding low-income programs	**2.72**	**2.92**	**2.52**
Commercial	**2.68**	**2.70**	**2.34**
Commercial Solutions MTP	2.92	2.92	2.48
Commercial SOP	4.57	4.57	3.65
Open MTP	1.40	1.40	1.26
SCORE/CitySmart MTP	2.99	3.10	2.88
SMART Source Solar PV MTP	2.99	2.99	3.02
Residential	**2.99**	**3.54**	**3.05**
Residential SOP	3.51	4.09	3.32
SMART Source Solar PV MTP	1.20	1.20	1.15
Hard-to-Reach SOP	2.60	3.42	3.42
Low Income	**1.12**	**1.12**	**1.12**
Targeted Low-Income Energy Efficiency Program	1.12	1.12	1.12
Load Management	**3.31**	**3.36**	**3.36**
Load Management SOP	3.31	3.36	3.36
Pilot	**0.17**	**0.17**	**0.17**
Efficiency Connection Pilot MTP	0.17	0.17	0.17

2.2 DETAILED FINDINGS—COMMERCIAL (HIGH/MEDIUM EVALUATION PRIORITY)

2.2.1 Commercial Standard Offer Program

A. Commercial Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	9.4%	427	427	100.0%
Energy Savings (kWh)	22.0%	2,704,863	2,704,863	100.0%

Completed Desk Reviews*	On-site M&V
5	2

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 CSOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made no adjustments to any of the savings calculations for the projects reviewed. Therefore, evaluated savings were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for five of the five projects that had desk reviews completed because sufficient documentation was provided. Since sufficient documentation was provided for 100 percent of the sampled projects, the program documentation score for these estimates is Good.

2.2.2 Commercial Market Transformation Program

A. Commercial Solutions Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	8.6%	388	388	100.0%
Energy Savings (kWh)	22.1%	2,717,077	2,717,077	100.0%

Completed Desk Reviews*	On-site M&V
3	2

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made no adjustments to any of the savings calculations for the projects reviewed. Therefore, evaluated savings were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for three of the three projects that had desk reviews completed because sufficient documentation was provided. Since sufficient documentation was provided for 100 percent of the sampled projects, the program documentation score for these estimates is Good.

B. SCORE/CitySmart Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	5.7%	258	262	101.7%
Energy Savings (kWh)	10.6%	1,300,469	1,359,328	104.5%

Completed Desk Reviews*	On-site M&V
5	2

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 SCORE/CitySmart MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made an adjustment to the claimed savings for one project. This project resulted in an adjustment of greater than five percent and further details are provided below.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID # 846661: During the desk review, the EM&V team identified this lighting project was missing savings calculations for a number of lamps and fixtures that were originally post inspected as having been installed. Also, the final reviewer notes indicated a significant number of other LEDs did not have DLC qualification as of April 2015 and were removed from the project savings. When re-checked by the EM&V team, a portion of the removed units are believed to have been removed by accident during final review and calculator inventory consolidations. Also, the LEDs initially found not DLC qualified were indeed DLC certified in October 2015 and the EM&V added these lamps and fixtures back into the savings calculations. These findings increased energy savings and demand reduction resulting in 109 percent kW realization rate and 109 percent kWh realization rate. This site did not receive an on-site M&V visit.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for five of the five projects that had desk reviews completed because sufficient documentation was provided. Since sufficient documentation was provided for 100 percent of the sampled projects, the program documentation score for these estimates is Good.

2.3 DETAILED FINDINGS—RESIDENTIAL (HIGH/MEDIUM EVALUATION PRIORITY)

2.3.1 Residential standard offer

A. Residential Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	18.6%	844	867	102.7%
Energy Savings (kWh)	21.4%	2,624,877	2,683,120	102.2%

Completed Desk Reviews*	On-site M&V
0	0

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

Evaluated savings for the AEP TNC RSOP were 867 kW and 2,683,120 kWh, with realization rates of 103 percent and 102 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made through the data review: checking that tracking system data are aligned with deemed savings in the technical reference manual.

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data review realization rates are provided below.

i. Data review

The data review realization rates are 102 percent for energy savings and 103 percent for demand reduction. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rate is very close to 100 percent, indicating that the program tracking data analysis was consistent with the measure analysis in the TRM. The minor difference reflected in the data review realization rate is driven by a few factors.

***Ex-ante* savings listed as zero.** For 30 infiltration measures and 17 duct sealing measures, the *ex-ante* values were listed as zero, however the EM&V team was able to calculate savings for the measures based on the tracking data provided. This resulted in an increase in the realization rate.

Minor calculation differences. The team observed an additional minor divergence in energy savings for two wall insulation measures and two ceiling insulation measures. While ex-post energy impacts were lower for these measures, the impact of this discrepancy on the program-level results was negligible.

Heating system type. The team identified savings discrepancies for two air infiltration projects and one duct sealing project due to differences in heating system type used in the savings calculations compared to the type reported in the tracking system. This did not significantly impact the realization rate.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. All rounding discrepancies were found in the duct sealing measure category, which indicated rounding differences of up to 0.004 kW per measure and within 0.5 kWh. This did not significantly impact the realization rate.

B. Hard-to-Reach Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	5.0%	228	289	127.1%
Energy Savings (kWh)	5.9%	722,720	965,726	133.6%

Completed Desk Reviews*	On-site M&V
0	0

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

Evaluated savings for the AEP TNC Hard-to-Reach SOP were 289 kW and 965,726 kWh, with realization rates of 127 percent and 134 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at through the data review: checking that tracking system data are aligned with deemed savings in the technical reference manual.

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data review realization rates are provided below.

i. Data review

The data review realization rates are 134 percent for energy savings and 127 percent for demand reduction. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are greater than 100 percent, indicating that the program tracking data analysis is not consistent with the TRM measure analysis in some cases. The difference reflected in the data review realization rate is driven by a few factors.

Ducting efficiency, pre-leakage cap. TRM V2.1 contains limitations for the duct efficiency improvement measure, the application of which led to a difference in reported and evaluated savings for several measures. For residential standard offer programs, the TRM applies a cap to the initial leakage rate against which contractors can claim savings. For homes with an initial leakage rate greater than 35 percent of total fan flow, savings are awarded with respect to this cap rather than the initial leakage. Hard-to-reach programs are not required to apply this initial leakage cap.

For the AEP TNC Hard-to-Reach Standard Offer Program, 116 projects reported savings based on a calculation in which the pre-treatment duct leakage cap was triggered and applied. The EM&V team awarded savings based on the removal of the pre-treatment leakage cap. These changes resulted in a significant increase in the realization rate and were the main drivers affecting the realization rates.

Air infiltration eligibility requirements. TRM V2.1 contains several eligibility requirements for the infiltration reduction measure, application of which led to a difference in reported and evaluated savings for several measures. The TRM applies a cap to the pre-treatment infiltration against which contractors can claim savings, however hard-to-reach and low income programs are exempt from this pre-treatment infiltration cap.[8] For homes where the initial leakage exceeds 4.0 CFM_{50} per square foot, this cap is to be treated as the starting leakage. The TRM also requires that contractors reduce air leakage by at least 10 percent through implementation of this measure, with this requirement measured relative to the initial leakage cap where applied.

For the AEP TNC Hard-to-Reach Standard Offer Program, six projects reported savings based on a calculation in which the pre-treatment infiltration cap was triggered and applied. The EM&V team awarded savings based on the removal of the pre-treatment infiltration cap. These changes resulted in a small increase in the realization rate.

***Ex-ante* listed as zero.** For a small number of measures (eight duct sealing and seven air infiltration projects), the ex-ante value was listed as zero, however the EM&V team was able

[8] The deemed savings awarded for this measure are not considered to vary linearly with leakage above the level of the cap, and since few homes have such high initial leakage the cap also serves to prevent data entry errors.

to calculate savings for the measure based on the tracking data provided. This resulted in a small increase in the realization rate.

Minor calculation differences. The team observed an additional minor divergence in energy savings for five duct sealing projects that may stem from data input or calculation errors. The impact of these discrepancies is small, however, and does not appear to indicate any systematic error. This did not significantly impact the realization rate.

CFL winter demand reduction. TRM V2.1 specifies an approach for estimating both summer and winter peak usage, and guidance for claiming those savings representing the higher impacts between the two seasons. There was one instance where the EM&V team found the winter peak demand reduction to be larger than the summer peak demand reduction, despite the claimed savings reporting the summer kW. The EM&V team has reported the greater of the two values. This did not significantly impact the realization rate.

2.4 DETAILED FINDINGS—LOAD MANAGEMENT (HIGH/MEDIUM EVALUATION PRIORITY)

2.4.1 Load Management Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	37.0%	1,744	1,762	101.0%
Energy Savings (kWh)	0.0%	6,252	6,259	100.1%

Completed Desk Reviews*	On-site M&V
0	0

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

The EM&V team evaluated the AEP TNC Load Management Standard Offer Program by applying the TRM calculation method to interval meter data. The meter data was supplied in 15 minute increments at the ESIID level. Seven load management events occurred during PY2015. The dates and times were:

- June 23, 2015 from 3 p.m. to 4 p.m. (scheduled)
- June 23, 2015 from 4 p.m. to 5 p.m. (scheduled)
- July 22, 2015 from 4 p.m. to 6 p.m. (unscheduled)
- July 27, 2015 from 4 p.m. to 6 p.m. (unscheduled)
- July 29, 2015 from 4 p.m. to 6 p.m. (unscheduled)

- August 5, 2015 from 4 p.m. to 6 p.m. (unscheduled)
- August 10, 2015 from 4 p.m. to 6 p.m. (unscheduled)

TNC provided the EM&V team interval meter data, site level savings, and total savings for the two customers across six sites. One customer with three sites only participated in a single scheduled event. The second customer, also with three sites, participated in one scheduled event and five unscheduled events. The EM&V team calculated the site level savings from the meter data following the TRM methodology, identifying several sites with evaluated savings that differed from AEP TNC's savings. AEP TNC clarified that for participants with unscheduled events, average kW savings include only unscheduled events; scheduled events are only included in the kW savings when a participant does not participate in unscheduled events. However, kWh savings include all events for all participants.

The collaboration between the EM&V team and AEP TNC revealed AEP TNC's intention to use a calculation approach to differentiate between scheduled and unscheduled events, whereas the savings TNC had originally provided used an approach that included all events for all participants. As a result, AEP TNC provided the EM&V team with new savings results (kW and kWh). The EM&V team recalculated savings based upon the updated methodology and compared savings with AEP TNC's updated savings results. The EM&V Team found differences between their results and AEP TNC's updated savings results. Savings differences were present at the site level, though with a minor difference in total kW and kWh.

In subsequent discussions and analysis, the EM&V team was able to resolve the differences between the AEP TNC calculations and EM&V team's calculations. There were three causes:

1. The initial savings provided to the EM&V team were 10 kW lower than updated savings.
2. One participant had a baseline day's kW different from the EM&V team's. In researching the issue, the EM&V team found that for the specific baseline day, AEP TNC had selected one day prior to the baseline period. This day was a weekday, very close to the event day, and had its effect muted through the averaging of baseline days kW.
3. The procedural steps used by AEP TNC differed from the EM&V team's in terms of how specific event savings were aggregated to arrive at the program total for the year. The EM&V team calculated average sponsor savings and summed the total, whereas AEP TNC summed sponsor savings for each event and averaged the events. The difference between results is due to rounding that occurs during the summing and averaging steps.

The EM&V team was able to replicate the savings results presented by AEP TNC and adopted the AEP TNC procedure to resolve differences. However, the EM&V team is presenting savings using the baseline day that aligns with the stated TRM approach and is calculating slightly higher kW savings than AEP TNC. The difference also affects the kWh savings.

Evaluated savings for the AEP TNC Load Management SOP were 1,762 kW and 6,259 kWh. The realization rate for kW was 101 percent and the realization rate for kWh is 100 percent as the difference in results is minor.

2.5 SUMMARY OF LOW PRIORITY EVALUATION PROGRAMS

Table 2-4 provides a summary of claimed savings for AEP TNC's low evaluation priority programs in PY2015, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2015 tracking data provided to the EM&V team for the EM&V Database.

Table 2-4. PY2015 Claimed Savings (Low Evaluation Priority Programs)

Program	Program Contribution To Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	Program Contribution To Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)
Open MTP	8.6%	392	13.7%	1,680,387
SMART Source[SM] Solar PV MTP (COM)	2.2%	101	1.6%	194,416
SMART Source[SM] Solar PV MTP (RES)	1.5%	67	1.1%	129,664
Targeted Low-Income Energy Efficiency Program	1.9%	88	1.5%	186,149
Efficiency Connection Pilot MTP	0.1%	5	0.2%	22,397

2.5.1 Low Income Weatherization

A. Data review

The data review realization rates are 100 percent for for both demand reduction and energy savings. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are 100 percent for for both demand reduction and energy savings, indicating that the program tracking data is very consistent with the values in the TRM. However, several minor factors led to small differences between tracking and evaluated savings.

Refrigerators. TRM V2.1 specifies that in order to calculate refrigerator savings for early retirement the annual energy consumption of the replaced unit is required. This information was not provided in the utilty tracking data for this program and could not be used to calculate savings. For this reason, the team estimated ex-post savings based on calculations for replace on burnout measures. This results in a low realization rate for refrigerator measures; however, low frequencies of installation for this program meant that these discrepancies did not materially affect the overall realization rate.

Minor calculation differences. The team observed additional minor divergences in energy savings and demand reduction for window AC, heat pump, and wall insulation measures that

may stem from data input or calculation errors. The impact of these discrepancies is small, however, and does not appear to indicate any systematic error.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. With the exception of duct sealing measures, which indicated rounding differences of up to 0.004 kW per measure, all identified variations due to rounding were within 1 kWh and 0.001 kW.

3. IMPACT EVALUATION RESULTS—CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC

This section presents the evaluated savings and cost-effectiveness results for CenterPoint's 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 only verified through the EM&V Database are included.

3.1 KEY FINDINGS

3.1.1 Evaluated savings

CenterPoint's evaluated savings for PY2015 were 168,489 in demand (kW) and 189,551,012 in energy (kWh) savings. Both the overall kW portfolio realization rate and the overall kWh portfolio realization rates are slightly above 100 percent. CenterPoint's responsiveness to the EM&V team for identified savings adjustments also supported the healthy realization rates.

Table 3-1 shows the claimed and evaluated demand reduction for CenterPoint's portfolio and broad customer sector/program categories for PY2015.

Table 3-1. CenterPoint Program Year 2015 Claimed and Evaluated Gross Demand Reduction

Level of Analysis	Percent Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	2015 Evaluated Demand Reduction (kW)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**168,489**	**169,148**	**100.4%**	**0.1%**
Commercial Sector	10.6%	17,817	17,805	99.9%	0.1%
Residential Sector	17.3%	29,155	29,501	101.2%	0.8%
Load Management	70.9%	119,442	119,718	100.2%	N/A
Pilots	1.2%	2,075	2,124	102.4%	0.0%

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

Table 3-2 shows the claimed and evaluated energy savings for CenterPoint's portfolio and broad customer sector/program categories for PY2015.

Table 3-2. CenterPoint Program Year 2015 Claimed and Evaluated Gross Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)	2015 Evaluated Energy Savings (kWh)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**188,255,211**	**189,551,012**	**100.7%**	**2.4%**
Commercial Sector	54.8%	103,243,162	102,408,409	99.2%	0.6%
Residential Sector	38.4%	72,266,886	74,195,558	102.7%	9.5%
Load Management	0.4%	718,308	718,308	100.0%	N/A
Pilots	6.4%	12,026,856	12,228,738	101.7%	0.0%

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

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

In program-level realization rates, we have also included a program documentation score of good, fair, or limited as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent–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 score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs and/or high savings programs have been identified. CenterPoint received a good kW program documentation score and a good kWh program documentation score for PY2015.[9] As program documentation recommendations from the PY2013 EM&V effort are to come into effect in PY2015, the EM&V team did expect program documentation scores to improve between PY2013 and PY2015.

3.1.2 Cost-effectiveness results

CenterPoint's overall portfolio had a cost-effectiveness of 2.59, or 2.80 excluding low-income programs.

The more cost-effective programs were ENERGY STAR Homes MTP and Advanced Lighting Residential. The less cost-effective programs were Energy Wise Resource Action Program and several pilot programs. Pilot programs in their first year of operation are not required to pass cost-effectiveness.

[9] In PY2015, only high and medium priority programs received documentation scores. Therefore, overall documentation scores are based only on high and medium priority programs.

The lifetime cost of PY2015 evaluated savings was $0.011 per kWh and $17.60 per kW.

Table 3-3. CenterPoint Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	**2.56**	**2.59**	**2.15**
Total Portfolio excluding low-income programs	**2.78**	**2.80**	**2.31**
Commercial	**3.31**	**3.29**	**2.68**
Large Commercial SOP	4.15	4.12	3.29
Commercial MTP	2.08	2.08	1.77
Retro-Commissioning MTP	2.51	2.51	2.26
Sustainable Schools Pilot	1.32	1.32	1.22
Retail Electric Provider (Com)	2.64	2.64	2.11
Residential	**2.80**	**2.87**	**2.32**
ENERGY STAR Homes MTP	4.83	5.06	3.54
Residential & SC SOP	1.75	1.79	1.39
Advanced Lighting Residential	4.90	4.90	4.41
A/C Distributor MTP	1.49	1.49	1.49
Retail Electric Provider (Res)	1.39	1.39	1.39
Multi-Family MTP (Res)	1.82	1.82	1.46
Multi-Family MTP (HTR)	2.33	2.33	2.33
Energy Wise Resource Action MTP	0.72	0.72	0.58
Hard-to-Reach SOP	1.60	1.60	1.60
Retail Electric Provider (Income Qual)	0.43	0.43	0.43
Low Income	**1.69**	**1.69**	**1.69**
Targeted Low Income (Agencies in Action) MTP	1.69	1.69	1.69
Load Management	**1.63**	**1.63**	**1.63**
Large Commercial Load Management SOP	1.63	1.63	1.63
Pilot	**1.59**	**1.62**	**1.36**
Data Centers Pilot	1.87	1.90	1.61
Pool Pump Pilot (Com)	0.21	0.21	0.18
Pool Pump Pilot (Res)	1.29	1.37	1.09

3.2 DETAILED FINDINGS—COMMERCIAL (HIGH/MEDIUM EVALUATION PRIORITY)

3.2.1 Commercial standard offer

A. Commercial Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	6.9%	11,574	11,562	99.9%
Energy Savings (kWh)	40.5%	76,024,916	75,190,163	98.9%

Completed Desk Reviews*	On-site M&V
24	12

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 Commercial MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made several adjustments to the claimed savings for eight projects. One project resulted in adjustments of less than five percent and seven projects had adjustments of greater than five percent and for whom further details are provided below.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID #785391: This site had both lighting and VFD projects. During the on-site M&V visit, the EM&V team found the post retrofit light fixture wattages to be higher (72 watts) than that reported (55 watts). For the VFD component of the project, the EM&V team found the average operating demand (kW) as calculated from the VFDs site logged data was higher at 3.96 for AHU-1 and 5.13 for AHU-2 as compared to initial reported estimates of 2.05 for both AHUs. The annual operating hours were also found to be lower at 3,790 hours per year (versus reported 6,158) when using the actual building occupied hours plus a 20 percent allowance for after hours usage per the TRM guidance. The 6,158 reported hours were found to be based on metered operation of an AHU at another similar facility. However, the other facility operates different hours each day and is open on Sunday's for which the facility evaluated is closed. Therefore, the metered data was not considered applicable for the facility under reviewed. Overall these updates to the project savings calculations resulted in a 64 percent decrease in the evaluated demand reduction and 77 percent decrease in the evaluated energy savings as compared to the initial reported savings. The EM&V team confirmed that the

utility corrected the calculator and claimed savings within the tracking system, which resulted in a 100 percent realization rate for the projects energy savings and demand reduction.

Project ID #785392: During the on-site M&V visit for this VFD project, the EM&V team found the average operating demand (kW) as calculated from the VFDs site logged data was higher for one unit and lower for another at 3.94 for AHU-1 and 2.24 for AHU-2 as compared to initial reported estimates of 1.54 for AHU-1 and 4.11 for AHU-2. The annual operating hours were also found to be lower at 3,790 hours per year (versus reported 6,158) when using the actual building occupied hours plus a 20 percent allowance for after hours usage per the TRM guidance. The 6,158 reported hours were found to be based on metered operation of an AHU at another similar facility. However, the other facility operates different hours each day and is open on Sunday's for which the facility evaluated is closed. Therefore, the metered data was not considered applicable for the facility under reviewed. Overall these updates to the project savings calculations resulted in a 46 percent decrease in the evaluated energy savings as compared to the initial reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which resulted in a 100 percent realization rate for the project's energy savings.

Project ID #785418: During the on-site M&V visit for this VFD project, the EM&V team found the average operating demand (kW) as calculated from the VFDs site logged data was higher at 1.95 for AHU-1 as compared to initial reported estimates of 1.54 for AHU-1. The annual operating hours were also found to be lower at 3,707 hours per year (versus reported 6,158) when using the actual building occupied hours plus a 20 percent allowance for after hours usage per the TRM guidance. The 6,158 reported hours were found to be based on metered operation of an AHU at another similar facility. However, the other facility operates different hours each day and is open on Sunday's for which the facility evaluated is closed. Therefore, the metered data was not considered applicable for the facility under reviewed. Overall these updates to the project savings calculations resulted in a 54 percent decrease in the evaluated energy savings as compared to the initial reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which resulted in a 100 percent realization rate for the project's energy savings.

Project ID #785438: This site had both lighting and VFD projects. During the on-site M&V visit, the EM&V team found additional post retrofit light fixture quantities in the meeting room as compared to reported. For the VFD component of the project, the EM&V team found the average operating demand (kW) as calculated from the VFDs site logged data was higher at 4.76 for AHU-1 and 4.86 for AHU-2 as compared to initial reported estimates of 3.08 for both AHUs. The annual operating hours were also found to be lower at 3,790 hours per year (versus reported 6,158) when using the actual building occupied hours plus a 20 percent allowance for after hours usage per the TRM guidance. The 6,158 reported hours were found to be based on metered operation of an AHU at another similar facility. However, the other facility operates different hours each day and is open on Sunday's for which the facility evaluated is closed. Therefore, the metered data was not considered applicable for the facility under reviewed. Overall these updates to the project savings calculations resulted in a -613 percent decrease in the evaluated demand reduction and 66 percent decrease in the evaluated energy savings as compared to the initial reported savings. The EM&V team confirmed that the

utility corrected the calculator and claimed savings within the tracking system, which resulted in a 100 percent realization rate for the project's energy savings and demand reduction.

Project ID #785473: During the on-site M&V visit for this VFD project, the EM&V team found the average operating demand (kW) as calculated from the VFDs site logged data was was higher at 9.00 for AHU-1 and 3.75 for AHU-2 as compared to initial reported estimates of 4.11 for AHU-1 and 1.54 for AHU-2. The annual operating hours were also found to be lower at 3,790 hours per year (versus reported 6,158) when using the actual building occupied hours plus a 20 percent allowance for after hours usage per the TRM guidance. The 6,158 reported hours were found to be based on metered operation of an AHU at another similar facility. However, the other facility operates different hours each day and is open on Sunday's for which the facility evaluated is closed. Therefore, the metered data was not considered applicable for the facility under reviewed. Overall these updates to the project savings calculations resulted in a 54 percent decrease in the evaluated energy savings as compared to the initial reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which resulted in a 100 percent realization rate for the project's energy savings.

Project ID #785502: During the on-site M&V visit for this VFD project, the EM&V team found the average operating demand (kW) as calculated from the VFDs site logged data was was higher at 9.89 for AHU-1 as compared to initial reported estimates of 6.16 for AHU-1. The annual operating hours were also found to be lower at 3,790 hours per year (versus reported 6,158) when using the actual building occupied hours plus a 20 percent allowance for after hours usage per the TRM guidance. The 6,158 reported hours were found to be based on metered operation of an AHU at another similar facility. However, the other facility operates different hours each day and is open on Sunday's for which the facility evaluated is closed. Therefore, the metered data was not considered applicable for the facility under reviewed. Overall these updates to the project savings calculations resulted in a 65 percent decrease in the evaluated energy savings as compared to the initial reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which resulted in a 100 percent realization rate for the project's energy savings.

Project ID #785589: During the on-site M&V visit for this VFD project, the EM&V team found the average operating demand (kW) as calculated from the VFDs site logged data was higher at 6.69 for AHU-1 as compared to initial reported estimates of 3.08 for AHU-1. The annual operating hours were also found to be lower at 3,707 hours per year (versus reported 6,158) when using the actual building occupied hours plus a 20 percent allowance for after hours usage per the TRM guidance. The 6,158 reported hours were found to be based on metered operation of an AHU at another similar facility. However, the other facility operates different hours each day and is open on Sunday's for which the facility evaluated is closed. Therefore, the metered data was not considered applicable for the facility under reviewed. Overall these updates to the project savings calculations resulted in an 80 percent decrease in the evaluated energy savings as compared to the initial reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which resulted in a 100 percent realization rate for the project's energy savings.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for five of the five projects that had desk reviews completed because sufficient documentation was provided. Since sufficient documentation was provided for 100 percent of the sampled projects, the program documentation score for these estimates is Good.

3.2.2 Commercial Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	2.2%	3,635	3,635	100.0%
Energy Savings (kWh)	9.8%	18,411,505	18,411,505	100.0%

Completed Desk Reviews*	On-site M&V
5	4

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 Commercial MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made adjustments to the claimed savings for one project. CenterPoint responded to the recommended adjustments for this project and therefore final realization rates were 100 percent, which is reflected in the overall program's realization rate.

Details on the initial project specific savings adjustments are listed below by Project ID:

Project ID #841887: This site had both HVAC and lighting projects. During the desk review and on-site M&V visit, the EM&V team identified multiple LED fixture types and quantities within the project that were not DLC certified, and for which their demand energy reduction is not included as part of the lighting power density (LPD) or savings calculations. However, the EM&V team found the project used a 3.8 multiplier instead of the 5 times multiplier per guidance found in the "Nonqualifying LEDs guidance memo final 7 17 2015." Overall these updates to the project savings calculations resulted in a 7 percent decrease in the evaluated demand reduction and 6 percent decrease in the evaluated energy savings as compared to the initial reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which resulted in a 100 percent realization rate for the project's energy savings and demand reduction.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for five of the five projects that had desk reviews completed because sufficient documentation was provided. Since sufficient documentation was provided for 100 percent of the sampled projects, the program documentation score for these estimates is Good.

3.3 DETAILED FINDINGS—RESIDENTIAL (HIGH/MEDIUM EVALUATION PRIORITY)

3.3.1 Residential standard offer

A. Residential Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	0.3%	496	434	87.5%
Energy Savings (kWh)	0.6%	1,054,290	1,073,696	101.8%

Completed Desk Reviews*	On-site M&V
0	0

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

Evaluated savings for the CenterPoint RSOP were 434 kW and 1,073,696 kWh, with realization rates of 88 percent and 102 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made through the data review: checking that tracking system data are aligned with deemed savings in the technical reference manual

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data review realization rates are provided below.

i. Data review

The data review realization rates are 102 percent for energy savings and 88 percent for demand reduction. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are 102 percent for energy savings and 88 percent for demand reduction, indicating that the program tracking data are more consistent with the values in the TRM for energy than demand. The minor difference reflected in the data review realization rate is driven by a few factors.

Heat Pump, demand reduction calculations. TRM V2.1 specifies deemed savings values for summer and winter savings, and guidance for claiming those savings representing the higher impacts between the two seasons. In the claimed savings the EM&V team found that the summer and winter savings had been added together and listed as a single value.The EM&V team has reported only the greater of the two values resulting, in a decrease in realization rate for demand only.

Ceiling Insulation, demand reduction calculations. The EM&V team found instances where ex-ante demand reduction for ceiling insulation had been calculated using electric heating type, rather than the heating type listed in the tracking system. The EM&V team used the listed heating type to calculate demand reduction resulting in a decrease in realization rate for demand only.

Ex-ante listed as zero. For a small number of measures the ex-ante value was listed as zero, however the EM&V team were able to calculate savings for the measure based on the tracking data provided. This results in an increase in the realization rate for ceiling insulation, central AC, and window measures.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. All identified variations due to rounding were within 1 kWh and 0.001 kW.

B. Hard-to-Reach Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	0.8%	1,289	1,289	100.0%
Energy Savings (kWh)	1.4%	2,629,588	2,629,588	100.0%

Completed Desk Reviews*	On-site M&V
0	0

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

Evaluated savings for the CenterPoint Hard-to-Reach SOP were 1,289 kW and 2,629,588 kWh, with realization rates of 100 percent for both demand reduction and energy savings.

The realization rates were driven by adjustments to claimed energy and peak savings made at through the Data review: to check that tracking system data are aligned with deemed savings in the technical reference manual

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data review realization rates are provided below.

i. Data review

The data review realization rates are 100 percent for both energy savings and demand reduction. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are approximately 100 percent, indicating that the program tracking data is consistent with the values in the TRM. The minor difference reflected in the data review realization rate is driven by a few factors.

Ex-ante listed as zero. For a small number of measures the ex-ante value was listed as zero, however the EM&V team were able to calculate savings for the measure based on the

tracking data provided. This results in an increase in the realization rate for ceiling insulation and CFLs.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. All identified variations due to rounding were within 1 kWh and 0.001 kW.

3.3.2 Residential market transformation

A. ENERGY STAR® Homes Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	8.1%	13,594	14,001	103.0%
Energy Savings (kWh)	16.9%	31,821,146	33,730,412	106.0%

Completed Desk Reviews*	On-site M&V
17	0

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

Evaluated savings for CenterPoint's ENERGY STAR® Homes MTP were 14,001 kW and 33,730,412 kWh, with realization rates of 103 percent and 106 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made largely based on inconsistencies with how mechanical ventilation was being treated in the field by Raters. This issue was discovered midway through the PY2015 program year by the implementer, who brought it to both CenterPoint's and the EM&V team's attention. Over several weeks during the second half of PY2015, the implementer, EM&V team, and CenterPoint engaged in a number of conversations related to savings adjustments due to the mechanical ventilation coding variations. To help ensure the accuracy of the re-coding process, the EM&V team randomly selected 415 program homes and asked the implementer to provide select data from both the original savings file and the updated savings file for each sampled home. Due to the mechanical ventilation coding discrepancy, the EM&V team completed an analysis of the 415 sampled homes in addition to 17 desk reviews, though only ten desk reviews were initially planned.

In order to complete a comprehensive desk review for this program, the EM&V team requested all typical project documentation associated with each sampled project, including the application, reports of QA/QC or M&V activity if conducted, documentation for how the as-built home compares to the base home, and modeling and energy savings information. For PY2015, the EM&V team received a REM/Rate file and Fuel Summary Report for each

sampled project, as well as the implementer's rated and reference home inputs in an Excel file, which provided additional insight into the modeling process.

Across the 17 desk reviews the EM&V team completed, we did see slight variation in realization rates when assessing only the REM/Rate files. Some of this variation could be related to the fact that we do not have access to the Beacon modeling tool in its entirety. Historically, the EM&V team would have reported realization rates based on these desk reviews. However, because the EM&V team had a robust sample of 415 homes, CenterPoint's ENERGY STAR® Homes MTP realization rates are based on the EM&V team's analysis of this sample, resulting in realization rates of 103 percent and 106 percent for demand and energy, respectively.

Because the implementer for this program leverages an M&V methodology for calculating savings on a per-home basis, the EM&V team worked with both CenterPoint and the implementer to finalize the M&V methodology that is included with Texas TRM 3.0, Volume 4.

Because sufficient supporting documentation for all sampled homes was received, the program documentation score is Good.

3.4 DETAILED FINDINGS—LOAD MANAGEMENT (HIGH/MEDIUM EVALUATION PRIORITY)

3.4.1 Large Commercial Load Management Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	62.9%	106,035	106,035	100.0%
Energy Savings (kWh)	0.3%	636,210	636,210	100.0%

Completed Desk Reviews*	On-site M&V
0	0

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

The EM&V team evaluated the PY2015 CenterPoint Large Commercial Load Management Standard Offer Program by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15 minute increments at the ESIID level. Two load management events occurred during PY2015 on the following dates and times:

- June 26, 2015 from 2 p.m. to 5 p.m.
- August 11, 2015 from 2 p.m. to 5 p.m.

The EM&V team received the interval meter data as well as spreadsheets detailing the CenterPoint calculated baseline load, event load, and savings results for each event and ESIID. The EM&V team reviewed the ESIID meter records and identified a large number of cases with either duplicate data or data that appeared to be an error code. In reviewing the meter data with CenterPoint, the EM&V team learned that a customer tracking system change implemented after CenterPoint had calculated savings, led to the meter data issues. CenterPoint examined the problematic meter data and provided the EM&V team with an updated dataset.

The EM&V team applied CenterPoint's TRM calculation methodology to the updated meter data and found only a slight difference (0.002 percent) in aggregate kW savings calculations. The EM&V team calculated kWh savings from the individual ESIID results. In consultation with CenterPoint, the kWh savings calculated by the program only covered three hours of event time and not the full six hours. As a result, the EM&V team calculated kWh savings nearly double that of CenterPoint's calculated kWh savings.

Evaluated savings for the CenterPoint Large Commercial Load Management SOP are 106,035 kW and 636,210 kWh. The realization rate for both kW and kWh is 100 percent.

3.5 DETAILED FINDINGS—PILOTS (HIGH/MEDIUM EVALUATION PRIORITY)

3.5.1 Pool Pump Pilot Program (Commercial)

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	<0.05%	13	13	100.0%
Energy Savings (kWh)	0.1%	95,206	95,206	100.0%

Completed Desk Reviews*	On-site M&V
3	0

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

The PY2015 Commercial Pool Pump Pilot Program evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program are listed above.

The EM&V team made no adjustments to any of the savings calculations for the projects reviewed. Therefore, evaluated savings were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for two of the three projects that had desk

reviews completed because sufficient documentation was provided. In particular, one project that had incomplete documentation, was missing invoice and photo documentation. Since sufficient documentation was provided for 67 percent of the sampled projects, the program documentation score for these estimates is Limited.

3.5.2 Pool Pump Pilot Program (Residential)

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	0.4%	705	705	100.0%
Energy Savings (kWh)	1.3%	2,395,289	2,589,054	108.1%

Completed Desk Reviews*	On-site M&V
3	0

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

The PY2015 Residential Pool Pump Pilot Program evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program are listed above.

The EM&V team made an adjustment to the claimed savings for one project. This project resulted in an adjustment of greater than five percent and further details are provided below.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID #892882: During the desk review, the EM&V team found the new pumps programmed settings were overlapping. Settings were originally listed for speed one to operate for 12 hours from 0500 to 1700 and for speed two to operate three hours from 0700 to 1000, or overlapping by three hours (0700 to 1000). The total time for speed ones operating hours were reduced from 12 to nine to eliminate the duplicate hours of operation between speeds one and two for a total pump run time of 12 hours as opposed to 15. Based on these findings, the EM&V team updated the project savings, which resulted in an increase in the evaluated energy savings and a slight reduction in evaluated demand reduction from the reported savings. These findings overall resulted in 117 percent kWh and 99 percent kW realization rates.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for three of the three projects that had desk reviews completed because sufficient documentation was provided. Since sufficient documentation was provided for 100 percent of the sampled projects, the program documentation score for these estimates is Good.

3.5.3 Retail Electric Provider Pilot MTP Program (Residential Demand Response)

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	8.0%	13,407	13,683	102.1%
Energy Savings (kWh)	<0.05%	82,098	82,098	100.0%

Completed Desk Reviews*	On-site M&V
0	0

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The EM&V team evaluated CenterPoint's Residential Demand Response Market Transformation Pilot Program by applying the TRM calculation method to interval meter data. The meter data was supplied in 15 minute increments at the ESIID level. Two separate three hour load management events occurred during PY2015:

- June 26, 2015 from 1:30 p.m. to 4:30 p.m.
- August 11, 2015 from 3 p.m. to 6 p.m.

In addition to the meter level data, the EM&V team received ESIID specific savings calculated by CenterPoint for each of the 8,630 residential participants' events and average performance between both events. The EM&V team applied the TRM approach using the High 3 of 5 method for developing the baseline. In that method, the event hours for the prior five non-holiday weekdays are analyzed, with the highest three selected and averaged to set the baseline. An adjustment factor is applied to the baseline by analyzing the hours for the baseline days' and event day's average demand two hours prior to the event to account for specific differences that can occur on event days. The adjustment can be additive or subtractive to the event hours' baseline.

In analyzing the meter data, the evaluation found 4 ESIIDs with duplicate meter readings that had mismatched kWh for the 15 minute periods. In consultation with CenterPoint, the meter reading discrepancies were determined to be due to changes in the underlying data system. As this was a minor issue in terms of the whole program, the evaluation did not evaluate these four cases directly. Rather, for these four cases, the evaluation applied the average savings of the remaining 8,626 participants to arrive at the program year total. In evaluating the kWh savings, the EM&V team found that CenterPoint had not applied savings from both events to their claimed kWh. The EM&V team applied the average program savings to all six of the event hours, resulting in the very high realization rate presented in the table, above.

The EM&V team calculated 13,683 kW as the average demand reduction between the two events, resulting in a realization rate of 102 percent. In the case of kWh, the EM&V team calculated total kWh savings for the six event hours at 82,098 kWh with a realization rate of 100 percent.

3.5.4 Data Centers Pilot

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	0.5%	912	961	105.4%
Energy Savings (kWh)	4.3%	8,117,580	8,125,697	100.1%

Completed Desk Reviews*	On-site M&V
5	2

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 Data Centers Pilot Program evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made adjustments to the claimed savings for two projects. Both projects resulted in adjustments of greater than five percent and further details are provided below.

Details on the initial project specific savings adjustments are listed below by Project ID:

Project ID #894555: This was a custom project that included the installation of variable frequency drives (VFD) on Computer Room Air Handlers' (CRAH) supply fan motors. During the desk review and on-site M&V visit, the EM&V team identified the project savings methodology were closely aligned to those of the TRMs for an HVAC VFD on air handler unit (AHU) supply fans measure. However, as the building type is not represented within the TRM, a custom approach for key variables (e.g.,operating hours, coincidence) were developed. The on-site M&V visit found a variety of key savings assumptions in need of adjustment as follows. The motor efficiency for all fourteen of the 15 hp fan motors in the CRAHs serving Phase 4 were reported as 92.4 percent, which aligns with a National electrical Manufactorers Association (NEMA) rated motor type of totally enclosed, fan cooled (TEFC) operating at 1800 revolutions per minute (RPM). This was adjusted to 93 percent based on field verification that the motors were open drip proof (ODP), with a NEMA rated efficiency of 93 percent at 1800 RPM. The cooling efficiency of the HVAC equipment was assumed to be 0.577 kW per ton in the reported calculations, based on TRM version 2.1, volume 3, Table 2-21 for water-cooled

chillers. However, the field verification confirmed that the pre and post HVAC equipment were 300-ton and 400-ton air-cooled chillers, so the cooling efficiency was adjusted to reflect code efficiencies (ASHRAE 90.1-2010) per TRM version 2.1, volume 3, Table 2-19. The efficiency of the 2005 air-cooled chillers in the ex-post case is 9.554 EER, or 1.255 kW per ton. Other ex-post adjustments were made to the savings to take into account additional impacts to system efficiencies due to the new system design that were not accounted for in the reported savings. When motors are retrofit with VFDs, their efficiency is impacted (reduced) slightly. The impacts for these VFD losses were added to the ex-post savings calculations. In addition, savings reductions at the central plant due to changes in the control of the cooling load via airflow modulation in lieu of discharge air temperature in the base case was also estimated and added to the ex-post savings calculations. As more time is likely spent at lower discharge air temperatures in the post case, the chiller is likely required to run at lower supply temperatures more often. This would yield a net derating of seasonal efficiency relative to the base case, and thus a slight net decrease in savings impacts. Also, with lower discharge air temperatures, the latent and total load on the plant is likely now higher, causing a slight net decrease in savings impacts. Based on these results, the EM&V team updated the project savings, which resulted in overall savings increases with an energy savings realization rate of 101 percent kWh and overall energy demand reduction realization rate of 112 percent kW.

Project ID #894554: During the desk review, the EM&V team found a significant lack of data for a portion of the key assumptions for this custom lighting project. The project involved four distinct lighting system retrofits that used the commission approved lighting calculator tool, however is considered custom as unique assumptions (e.g.,hours of use, coincidence factors) were used and are major drivers of the project savings. The ex-ante savings calculations utilized an oversimplified approach based mostly on undocumented pre- and post- operating hours and coincidence and included unsourced assumptions. Due to lack of proper documentation, end-use metering data, or facility billing data, the EM&V team was limited in determining whether these key variables were valid. Documentation was provided confirming other project information on the lighting fixtures and project scope (although it was not completely clear which measures were implemented as the invoices were not fixture specific), showing a significant amount of retrofit work performed. Given this, the savings were updated using the deemed values for the most appropriate building type selections. The only exception to changes made were that the manufacturing area hours of use at 8,760 were unchanged as documentation supported this assumption. Based on these results, the EM&V team updated the project savings, which resulted in an energy savings realization rate of 92 percent kWh and overall energy demand reduction realization rate of 89 percent kW. Further data and documentation may be provided to substantiate the custom assumptions and may result in further impacts to the project savings.

As part of previous evaluation reports (i.e., PY2012, PY2013, PY2014), the EM&V team recommended that the utility provide all pertinent documentation to aid in the independent evaluation of any project. Of the PY2015 projects reviewed, all four (100 percent) had limited project information and/or project documentation. The EM&V team was not able to verify key inputs and assumptions that went into the savings calculations for these projects. In particular, these assumptions included facility address/location and custom varables such hours of use, efficiencies of equipment, load factors, building area, equipment quantities and equipment specifications (wattages, efficiencies, ballast factors, etc.). Backup documentation

for these key project information and assumptions should be provided such as photographic documentation, field inspection notes, invoices, equipment make/model or photos of the equipment and nameplates. When metered results are obtained and used as part of the savings, a summary of the results should be provided to clearly indicate items such as, what data was used/not used, how was missing or erroneous data handled, and the raw data set should be provided. As many of these projects were custom in nature with numerous equipment and multiple measures, they inherently are more complex. Due to this, overall, project documentation should include a final M&V report to summarize the key assumptions and results in one place. This would greatly enhance the evaluability of the projects. Also, final claimed savings for each measure should be provided in one clear final calculation document (e.g.,Excel based spreadsheet, word document). The evaluation found project documentation files were unorganized and lacked clear file names or dated materials. All documents should included a date, which assists in documenting the projects sequence of events. This is especially important in tracking a project that has revisions or changes, and is an industry best practice and are critical elements for future evaluation needs. Maintaining consistent file naming also enhances clarity of the project information. Since sufficient documentation was provided for 0 percent of the sampled projects, the program documentation score for these estimates is Limited.

3.6 SUMMARY OF LOW PRIORITY EVALUATION PROGRAMS

Table 3-4 provides a summary of claimed savings for CenterPoint's low evaluation priority programs in PY2015, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2015 tracking data provided to the EM&V team for the EM&V Database.

Table 3-4. PY2015 Claimed Savings (Low Evaluation Priority Programs)

Program	Program Contribution To Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	Program Contribution To Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)
Retro-Commissioning MTP	0.6%	956	2.0%	3,690,760
Sustainable Schools Program	0.3%	445	0.8%	1,418,781
A/C Distributor MTP	1.3%	2,223	3.4%	6,335,951
Retail Electric Provider (COM)	1.0%	1,652	2.7%	5,115,980
Advanced Lighting Residential	1.4%	2,433	5.6%	10,619,029
Energy Wise Resource Action MTP	0.2%	384	0.7%	1,358,297
Retail Electric Provider (RES)[10]	2.1%	3,491	5.6%	10,550,520
Multi-Family MTP	1.6%	2,657	2.1%	3,922,569
Targeted Low Income MTP	1.5%	2,545	2.0%	3,850,519
Retail Electric Provider (Coolsaver Income Qualified)	0.0%	43	0.1%	124,977

3.6.1 Targeted Low Income MTP

A. Data review

The data review realization rates are 100 percent for for both demand reduction and energy savings. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are approximately 100 percent for both demand reduction and energy savings, indicating that the program tracking data is consistent with the values in the TRM. However, several minor factors led to small differences between tracking and evaluated savings.

Refrigerators. TRM V2.1 specifies that in order to calculate refrigerator savings for early retirement the annual energy consumption of the replaced unit is required. This information was not provided in the utilty tracking data for this program and could not be used to calculate savings. For this reason, the team estimated ex-post savings based on calculations for

[10] Excluding Residential Demand Response.

replace on burnout measures. This results in a low realization rate for refrigerator measures; however, low frequencies of installation for this program meant that these discrepancies did not materially affect the overall realization rate.

Ex-ante listed as zero. For a small number of measures the ex-ante value was listed as zero, however the EM&V team were able to calculate savings for the measure based on the tracking data provided. This results in an increase in the realization rate for air insulation measures.

Minor calculation differences. The team observed additional minor divergences in energy savings and demand reduction for ceiling insulation and heat pump measures that may stem from data input or calculation errors. The impact of these discrepancies is small, however, and does not appear to indicate any systematic error.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. With the exception of duct sealing measures, which indicated rounding differences of up to 0.003 kW per measure, all identified variations due to rounding were within 1 kWh and 0.001 kW.

4. IMPACT EVALUATION RESULTS—EL PASO ELECTRIC COMPANY

This section presents the evaluated savings and cost-effectiveness results for El Paso Electric's 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 only verified through the EM&V Database are included.

4.1 KEY FINDINGS

4.1.1 Evaluated savings

El Paso Electric's evaluated savings for PY2015 were 12,331 in demand (kW) and 22,284,283 in energy (kWh) savings. The overall kW portfolio realization rate is just above one hundred percent due to the realization rate of both Residential Solutions MTP and Hard-to-Reach MTP, which were slightly above 100 percent due to the EM&V tracking system adjustments across a census of projects. The overall portfolio realization rate for kWh is 100.

Table 4-1 shows the claimed and evaluated demand reduction for El Paso Electric's portfolio and broad customer sector/program categories for PY2015.

Table 4-1. El Paso Electric Program Year 2015 Claimed and Evaluated Gross Demand Reduction

Level of Analysis	Percent Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	2015 Evaluated Demand Reduction (kW)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**12,305**	**12,331**	**100.2%**	**0.0%**
Commercial Sector	28.6%	3,522	3,523	100.0%	0.0%
Residential Sector	14.4%	1,777	1,802	101.4%	0.1%
Load Management*	54.5%	6,711	6,711	100.0%	0.0%
Pilot	2.4%	295	295	100.0%	0.0%

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

Table 4-2 shows the claimed and evaluated energy savings for El Paso Electric's portfolio and broad customer sector/program categories for PY2015.

Table 4-2. El Paso Electric Program Year 2015 Claimed and Evaluated Gross Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)	2015 Evaluated Energy Savings (kWh)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**22,282,528**	**22,284,283**	**100.0%**	**0.3%**
Commercial Sector	77.1%	17,183,088	17,182,430	100.0%	0.0%
Residential Sector	20.1%	4,481,756	4,484,169	100.1%	1.3%
Load Management*	0.2%	33,555	33,555	100.0%	0.0%
Pilot	2.6%	584,130	584,130	100.0%	0.0%

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

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

In program-level realization rates, we have also included a program documentation score of good, fair, or limited as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent–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 score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs and/or high savings programs have been identified. El Paso Electric received a good kW program documentation score and a fair kWh program documentation score for PY2015.[11] As program documentation recommendations from the PY2013 EM&V effort are to come into effect in PY2015, the EM&V team did expect program documentation scores to improve between PY2013 and PY2015.

4.1.2 Cost-effectiveness results

El Paso Electric's overall portfolio had an evaluated cost-effectiveness of 4.00.

The more cost-effective programs were Commercial SOP and Large C&I Solutions MTP. The less cost-effective programs were LivingWise MTP and Commercial Rebate Pilot MTP. All programs passed cost-effectiveness based on evaluated savings results. The Commercial Rebate Pilot MTP passed with a ratio of 1.00 and had very low participation in 2015.

[11]In PY2015, only high and medium priority programs received documentation scores. Therefore, overall documentation scores are based only on high and medium priority programs.

The lifetime cost of evaluated PY2015 savings was $0.010 per kWh and $14.24 per kW.

Table 4-3. El Paso Electric Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	**3.99**	**4.00**	**3.99**
Commercial	**5.33**	**5.33**	**5.33**
Commercial SOP	7.17	7.17	7.17
Small Commercial Solutions MTP	4.15	4.15	4.15
Large C&I Solutions MTP	6.38	6.38	6.38
Texas SCORE MTP	3.59	3.59	3.59
Residential	**2.76**	**2.78**	**2.78**
Residential Solutions MTP	3.65	3.60	3.60
LivingWise MTP	1.56	1.56	1.56
Hard-to-Reach Solutions MTP	2.94	2.99	2.99
Appliance Recycling MTP	3.60	3.60	3.60
Load Management	**1.66**	**1.66**	**1.66**
Load Management SOP	1.66	1.66	1.66
Pilot	**2.89**	**2.89**	**2.80**
Commercial Rebate Pilot Program	1.18	1.18	1.18
Solar PV Pilot MTP (Res)	2.57	2.57	2.46
Solar PV Pilot MTP (Com)	6.86	6.86	6.92

4.2 DETAILED FINDINGS—COMMERCIAL (HIGH/MEDIUM EVALUATION PRIORITY)

4.2.1 Commercial Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	2.7%	329	329	100.1%
Energy Savings (kWh)	8.5%	1,896,844	1,894,567	99.9%

Completed Desk Reviews*	On-site M&V
10	2

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 CSOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made several adjustments to the claimed savings for four projects. Three projects resulted in adjustments of less than two percent each. Only one had an adjustment of greater than five percent and further details are provided below. El Paso Electric responded to the recommended adjustments in this project and therefore it's final realization rate was 100 percent, which is reflected in the overall program's realization rate.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID #868854: Per the desk review findings, the EM&V team identified three LED fixture types within the projects claimed savings that were not DLC certified, and thus removed from the savings calculations. Also, the EM&V team found fixture wattage differences than those provided within the ex-ante savings calculator. The LED fixtures selected within the calculator at 23 watts (model RIX15) and 54 watts (model RIX40) were adjusted to 25 watts and 56 watts respectively based upon their product specified fixture wattages. The desk review also found that there was no documentation provided within the project folder supporting the LED DLC certifications. The EM&V team performed additional research to validate the DLC certifications. These updates to the project savings resulted in a 24 percent decrease in the evaluated savings from the reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which resulted in a 100 percent realization rate for the projects energy savings and demand reduction. As evident from the reason for the savings gap above, the project had insufficient documentation, the lack of completeness of which may have contributed to the findings and would have avoided

such corrections made by the EM&V team. This site did not receive an on-site M&V visit.

As part of prior evaluation reports, the EM&V team recommended that the utility provide all pertinent documentation to aid in the independent evaluation of any project. There is still improvement needed for CSOP in this area as only 6 out of the 10 (60 percent) projects reviewed had sufficient documentation. Without adequate documentation, the EM&V team was not able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (wattages, efficiencies, ballast factors, etc.). In addition, all eight LED lighting projects lacked documentation of their fixtures DLC certifications. Of these LED projects, four were found with incorrect fixture wattages assumed. This finding further confirms that complete documentation enhances the accuracy and transparency of project savings along with ease of evaluation. Because sufficient documentation was provided for fewer than 70 percent of the sites in the sample, the EM&V team assigned a program documentation score of Limited.

4.2.2 Commercial Market Transformation Programs

A. Large C&I Solutions Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	15.8%	1,945	1,945	100.0%
Energy Savings (kWh)	42.7%	9,503,826	9,503,826	100.0%

Completed Desk Reviews*	On-site M&V
6	2

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 Large C&I Solutions MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made no adjustments to any of the savings calculations for the projects reviewed. Therefore, evaluated savings were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for six of the six projects that had desk reviews completed because sufficient

documentation was provided for the sites. Since sufficient documentation was provided for 100 percent of the sampled projects, the program documentation for these estimates is Good.

B. Texas SCORE Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	4.7%	577	578	100.1%
Energy Savings (kWh)	12.5%	2,774,905	2,776,524	100.1%

Completed Desk Reviews*	On-site M&V
6	2

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 SCORE MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made an adjustment to the claimed savings for one project. This project had an adjustment of greater than five percent and further details are provided below. El Paso Electric responded to the recommended adjustments in this project and therefore it's final realization rate was 100 percent, which is reflected in the overall program's realization rate.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID #865641: During the on-site M&V visit, the EM&V team found an error in the baseline fixture wattage for this lighting replacement project. The baseline fixture wattage was incorrectly input as 10 watts (2x5 watt) incandescent exit sign into the calculator. During the on-site visit, the EM&V team was able to confirm the existing exits signs were actually 25 watt (1x25 watt) incandescent exit signs. Based on these results, the EM&V team updated the baseline fixture wattage which resulted in higher savings. These updates to the project savings resulted in over 300 percent increase in the evaluated savings from the reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which ultimately resulted in a 100 percent realization rate for the projects energy savings and demand reduction. This project also received a desk review, however photo documentation of the pre and post inspection was not provided and therefore a full check of the equipment nameplate data could not be completed during the desk review.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, baseline conditions, and specifications) for five of the six projects that had desk reviews

completed because sufficient documentation was provided for the projects. Since sufficient documentation was provided for 83 percent of the sampled projects, the program documentation for these estimates is Fair.

4.3 DETAILED FINDINGS—RESIDENTIAL (HIGH/MEDIUM EVALUATION PRIORITY)

4.3.1 Residential Solutions Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	3.3%	400	404	100.9%
Energy Savings (kWh)	2.7%	600,956	580,457	96.6%

Completed Desk Reviews*	On-site M&V
23	0

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

Evaluated savings for the El Paso Electric Residential Solutions MTP were 400 kW and 580,457 kWh, with realization rates of 101 percent and 97 percent, respectively.

Generally, the realization rates were driven by adjustments to claimed energy and peak savings made at two levels:

- Data review, to check that tracking system data are aligned with deemed savings in the technical reference manual
- Desk review, to check that measure data collected by contractors on forms aligns correctly with that in the tracking system

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data and desk review realization rates are provided below.

A. Data review

The data review realization rates are 101 percent and 99 percent for demand reduction and energy savings, respectively. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are 101 and 99 percent for demand reduction and energy savings, respectively, indicating that the program tracking data is very consistent with the values in the TRM. However, several minor factors led to small differences between tracking and evaluated savings.

Air infiltration eligibility requirements. TRM V2.1 contains several eligibility requirements for the infiltration reduction measure, the application of which led to a difference in reported and evaluated savings for several measures. The TRM applies a cap to the pre-treatment infiltration against which contractors can claim savings.[12] For homes where the initial leakage exceeds 4.0 CFM_{50} per square foot, this cap is to be treated as the starting leakage. For this program the necessary information to apply this cap was unavailable in the tracking data and therefore was not assessed in calculating the *ex post* savings.[13]

The TRM also requires that contractors reduce air leakage by at least 10 percent through implementation of this measure, with this requirement measured relative to the initial leakage cap where applied. Two measures did not meet this requirement resulting in 0 savings for these measures.

Ceiling Insulation, winter demand reduction. TRM V2.1 specifies an approach for estimating both summer and winter peak usage, and guidance for claiming those savings representing the higher impacts between the two seasons. There are several instances where the EM&V team found the winter peak demand reduction to be larger than the summer peak demand reduction, despite the claimed savings reporting the summer kW. The EM&V team has reported the greater of the two values resulting, in a slight increase in realization rate.

Differences in rounding. The team identified minor differences between *ex-ante* and *ex-post* savings due to rounding. With the exception of duct sealing and pipe wrap measures, which indicated rounding differences of up to 0.002 kW per measure, all identified variations due to rounding were within 1 kWh and 0.001 kW.

Minor calculation differences. The team observed additional minor divergences in energy savings and demand reduction for a small number of showerhead and infiltration reduction measures that may stem from data input or calculation errors. The impact of these discrepancies is small, however, and does not appear to indicate any systematic error.

[12] The deemed savings awarded for this measure are not considered to vary linearly with leakage above the level of the cap, and since few homes have such high initial leakage the cap also serves to prevent data entry errors.

[13] Similarly, input assumptions necessary to assess a similar cap applied to pre-treatment CFM values for duct sealing measures (i.e., cooling equipment tonnage) were also not available in the tracking data.

B. Desk review

Desk reviews were completed for 23 projects, and resulted in desk review realization rates of 100 percent and 97 percent for demand reduction and energy savings, respectively. The EM&V team identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for six of the projects. The team noted the following transcription errors:

- The window area (sq. ft.) for two window replacement projects did not match the values in the project documentation. This resulted in minor increases in the realization rate.
- The heating type for two solar screen projects did not match the values in the project documentation. This resulted in minor decreases in the realization rate.
- The heating type for one ceiling insulation project did not match the value in the project documentation. This resulted in a minor increase in the realization rate.
- The available data for an air infiltration project allowed for verification of the cap on pre-CFM , for which fields were not present in the tracking data (e.g., number of stories, shielding, home area). This check resulted in cap applied to the pre-CFM value and resulted in a minor decrease in the realization rate.

C. Documentation

Documentation was requested for a total of 25 sites through the supplemental data request. Of these sites, documentation was provided for 25, of which 23 had sufficient documentation for review. As sufficient documentation was provided for more than 90 percent of the sampled sites, the program documentation score for these estimates is Good.

4.3.2 Hard-to-Reach Solutions Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	7.8%	964	985	102.2%
Energy Savings (kWh)	6.6%	1,479,742	1,502,655	101.5%

Completed Desk Reviews*	On-site M&V
23	0

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

Evaluated savings for the El Paso Electric Hard-to-Reach Solutions MTP were 985 kW and 1,502,655 kWh, with realization rates of 102 percent and 102 percent, respectively.

Generally, the realization rates were driven by adjustments to claimed energy and peak savings made at two levels:

- Data review, to check that tracking system data are aligned with deemed savings in the technical reference manual
- Desk review, to check that measure data collected by contractors on forms aligns correctly with that in the tracking system

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data and desk review realization rates are provided below.

A. Data review

The data review realization rates are 102 percent for both demand reduction and energy savings. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are 102 percent for both demand reduction and energy savings, respectively, indicating that the program tracking data is very consistent with the values in the TRM. However, several minor factors led to small differences between tracking and evaluated savings.

Ceiling Insulation, winter demand reduction. TRM V2.1 specifies an approach for estimating both summer and winter peak usage, and guidance for claiming those savings representing the higher impacts between the two seasons. There are several instances where the EM&V team found the winter peak demand reduction to be larger than the summer peak demand reduction, despite the claimed savings reporting the summer kW. The EM&V team has reported the greater of the two values resulting, in a slight increase in realization rate.

Differences in rounding. The team identified minor differences between *ex-ante* and *ex-post* savings due to rounding. With the exception of duct sealing and pipe wrap measures, which indicated rounding differences of up to 0.003 kW per measure, all identified variations due to rounding were within 1 kWh and 0.001 kW.

Minor calculation differences. The team observed additional minor divergences in energy savings and demand reduction for a small number of showerhead and infiltration reduction measures that may stem from data input or calculation errors. The impact of these discrepancies is small, however, and does not appear to indicate any systematic error.

B. Desk review

Desk reviews were completed for 23 projects, and resulted in desk review realization rates of 100 percent for both demand reduction and energy savings. The EM&V team identified no discrepancies between the tracking system data and the supporting documentation.

C. Documentation

Documentation was requested for a total of 23 sites through the supplemental data request. All 23 of these sites provided sufficient documentation for review. Since sufficient documentation was provided for more than 90 of the sampled sites, the program documentation score for these estimates is Good.

4.4 DETAILED FINDINGS—LOAD MANAGEMENT (HIGH/MEDIUM EVALUATION PRIORITY)

4.4.1 Load Management Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	54.5%	6,711	6,711	100.0%
Energy Savings (kWh)	0.2%	33,555	33,555	100.0%

Completed Desk Reviews*	On-site M&V
0	0

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

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

The EM&V team evaluated the PY2015 El Paso Electric Load Management Standard Offer Program by applying the TRM calculation methodology to interval (30 minute increment) meter data. Three load management events occurred during PY2015. The dates and times were:

- June 12, 2015 from 1 p.m. to 2:30 p.m. (scheduled)
- July 27, 2015 from 4:30 p.m. to 7 p.m. (unscheduled)
- August 21, 2015 from 2 p.m. to 3 p.m. (unscheduled).

El Paso Electric supplied the EM&V team with 30 minute interval meter data, individual participant savings, and participant event level savings results. There were 9 participants and with 3 events (27 participant event level savings results). Additionally, the EM&V team received spreadsheets showing El Paso Electric's construction of participant level savings from meter data. Finally, the EM&V team received a workbook that contained summary results for each participant, event, and calculated program savings.

The EM&V team applied the TRM methodology to the meter data and compared the participant event level savings to the El Paso results, finding agreement on nearly all (24 of 27) participants' event performances. In two cases, the EM&V team identified and confirmed

with El Paso Electric spreadsheet data transfer errors, affecting the utility's calculations and causing differences in savings results. In another case, the EM&V team was unaware that there was a participant in an interruptible rate class which participated simultaneously in a load management event and interruption event, which led to differences from El Paso's calculations when analyzing meter level savings.

The EM&V team was able to resolve the differences in calculation with El Paso Electric. El Paso Electric provided an updated set of event and participant performance results that aligned with the EM&V team's calculations. Additionally, the EM&V team recalculated savings for the interruptible rate class customer, with savings only being calculated below the firm delivery level which aligned its savings calculations for that participant event savings to that calculated by El Paso Electric.

Evaluated savings for the El Paso Electric Load Management SOP are 6,711 kW and 33,555 kWh. The realization rate for both kW and kWh are 100 percent.

4.5 SUMMARY OF LOW PRIORITY EVALUATION PROGRAMS

Table 4-4 provides a summary of claimed savings for El Paso Electric's low evaluation priority programs in PY2015, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2015 tracking data provided to the EM&V team for the EM&V Database.

Table 4-4. PY2015 Claimed Savings (Low Evaluation Priority Programs)

Program	Program Contribution To Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	Program Contribution To Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)
Small Commercial Solutions MTP	5.5%	672	13.5%	3,007,513
Appliance Recycling (RES)	1.5%	189	5.5%	1,235,160
LivingWise MTP	1.8%	223	5.2%	1,165,897
Commercial Rebate Pilot	0.1%	16	0.2%	46,488
PV/Solar Pilot (COM)	0.6%	72	0.6%	139,232
PV/Solar Pilot (RES)	1.7%	207	1.8%	398,410

5. IMPACT EVALUATION RESULTS—ENTERGY TEXAS, INC.

This section presents the evaluated savings and cost-effectiveness results for Entergy's 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 only verified through the EM&V Database are included.

5.1 KEY FINDINGS

5.1.1 Evaluated savings

Entergy's evaluated savings for PY2015 were 18,000 in demand (kW) and 39,420,091 in energy (kWh) savings with realization rates slightly below 100 percent for both kW and kWh. Table 5-1 shows the claimed and evaluated demand reduction for Entergy's portfolio and broad customer sector/program categories for PY2015.

Table 5-1. Entergy Program Year 2015 Claimed and Evaluated Gross Demand Reduction

Level of Analysis	Percent Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	2015 Evaluated Demand Reduction (kW)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**18,086**	**18,000**	**99.5%**	**0.0%**
Commercial Sector	25.2%	4,566	4,562	99.9%	0.1%
Residential Sector	34.3%	6,200	6,118	98.7%	0.0%
Load Management	40.5%	7,320	7,320	100.0%	0.0%

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

Table 5-2 shows the claimed and evaluated energy savings for Entergy's portfolio and broad customer sector/program categories for PY2015.

Table 5-2. Entergy Program Year 2015 Claimed and Evaluated Gross Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)	2015 Evaluated Energy Savings (kWh)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**39,687,596**	**39,420,091**	**99.3%**	**0.2%**
Commercial Sector	49.1%	19,476,033	19,389,481	99.6%	0.3%
Residential Sector	50.9%	20,188,030	20,007,077	99.1%	0.0%
Load Management	0.1%	23,533	23,533	100.0%	0.0%

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

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

In program-level realization rates, we have also included a program documentation score of good, fair, or limited as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent–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 score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs and/or high savings programs have been identified. Entergy received a good kW program documentation score and a good kWh program documentation score for PY2015.[14] As program documentation recommendations from the PY2013 EM&V effort are to come into effect in PY2015, the EM&V team did expect program documentation scores to improve between PY2013 and PY2015.

5.1.2 Cost-effectiveness results

Entergy's overall portfolio had a cost-effectiveness of 3.09.

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

The lifetime cost of PY2015 evaluated savings was $0.009 per kWh and $13.89 per kW.

[14]In PY2015, only high and medium priority programs received documentation scores. Therefore, overall documentation scores are based only on high and medium priority programs.

Table 5-3. Entergy Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	**3.11**	**3.09**	**2.59**
Commercial Sector	**3.43**	**3.42**	**3.01**
Commercial Solutions MTP	3.57	3.55	3.02
SCORE/CitySmart MTP	3.24	3.24	3.01
Residential Sector	**3.00**	**2.97**	**2.37**
Residential SOP	3.58	3.54	2.76
Entergy Solutions High Perf. Homes MTP	3.19	3.19	2.24
Hard-to-Reach SOP	1.88	1.85	1.85
Load Management	**1.63**	**1.63**	**1.63**
Load Management SOP	1.63	1.63	1.63

5.2 DETAILED FINDINGS—COMMERCIAL (HIGH/MEDIUM EVALUATION PRIORITY)

5.2.1 Commercial market transformation programs

A. Commercial Solutions Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	13.1%	2,377	2,374	99.9%
Energy Savings (kWh)	29.1%	11,536,029	11,477,425	99.5%

Completed Desk Reviews*	On-site M&V
16	5

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made several adjustments to the claimed savings for five projects. One project resulted in adjustments of less than two percent. The remaining four projects had an adjustment of four percent or greater and further details are provided below.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID # 843540: Per the desk review findings, the EM&V team identified the savings calculations for all interior lighting was assuming custom hours of use and coincidence factors. According to the tracking data, the project was identified as a deemed savings methodology. In addition, there was inadequate documentation provided within the project folder to justify the custom facility hours and coincidence assumptions. Therefore, the EM&V team calculated savings based on the TRM stipulated hours of use and coincidence for non-strip retail facility. These findings decreased energy savings and demand reduction resulting in a 91 percent kW realization rate and 93 percent kWh realization rate. The EM&V team confirmed that the utility corrected the PY2015 claimed savings within the tracking system, which resulted in a 100 percent realization rate for the projects energy savings and demand reduction. This site did not receive an on-site M&V visit.

Project ID # 845463: During the desk review on-site M&V visit, the EM&V team confirmed the project was new construction and the interior lighting portion of the project included a small number of non-qualifying LEDs. The savings methodology adjusted these non-qualifying LEDs so their demand energy reduction is not included as part of the lighting power density (LPD) or energy savings calculations. However, the EM&V Team found the project assumed a 3.8 multiplier instead of the five times multiplier per the EM&V Teams guidance in the "Nonqualifying LEDs guidance memo final 7 17 2015." These findings decreased energy savings and demand reduction resulting in a 96 percent kW realization rate and 96 percent kWh realization rate. The EM&V team confirmed that the utility corrected the PY2015 claimed savings within the tracking system, which resulted in a 100 percent realization rate for the projects energy savings and demand reduction.

Project ID # 845593: The EM&V team found the HVAC project was identified as a deemed savings methodology within the tracking data, however, during the desk review, the project was found to be using a custom savings approach. The key assumption for coincidence was found to be stipulated, however the hours of use were derived based on the local weather data and ASHRAE standards. Adjustments for the calculated equivalent full load hours (EFLH) for cooling were made. Since documentation did not confirm the actual heat load factors of the facility, an average of two for office buildings was used within the evaluations calculated EFLH value. This decreased EFLH cooling from 1,827 to 1,677 hours per year and resulted in a decrease from claimed energy savings of eight percent. Demand savings remain unchanged. These findings resulted in 100 percent kW realization rate and 92 percent kWh realization rate. This site did not receive an on-site M&V visit.

Project ID # 865003: During the desk review, the EM&V team confirmed the project was new construction and included both an HVAC and lighting component. The lighting portion of the project included a small portion of non-qualifying LEDs. The savings methodology adjusted these non-qualifying LEDs so their demand energy reduction is not included as part of the lighting power density (LPD) or energy savings calculations. However, the EM&V Team found the project assumed a 3.8 multiplier instead of the 5

times multiplier per the EM&V Teams guidance in the "Nonqualifying LEDs guidance memo final 7 17 2015." These findings decreased energy savings and demand reduction resulting in a 96 percent kW realization rate and 96 percent kWh realization rate for the lighting portion of the sites efficiency projects. The EM&V team confirmed that the utility corrected the PY2015 claimed savings within the tracking system, which resulted in a 100 percent realization rate for the projects energy savings and demand reduction. This site did not receive an on-site M&V visit.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for 15 of the 16 sites that had desk reviews completed because sufficient documentation was provided for the sites. The sufficient documentation also included modifications made to project savings due to post inspection findings. In order to receive sufficient documentation, the EM&V team went back to the implementation contractor and requested additional documentation beyond what was initially provided for one site, specifically confirmation of make and model numbers to support a project's post-existing HVAC type selections. Since sufficient documentation was provided for 94 percent of the sampled sites, the program documentation score for these estimates is Good.

B. SCORE/CitySmart Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	12.1%	2,189	2,188	100.0%
Energy Savings (kWh)	20.0%	7,940,005	7,912,056	99.6%

Completed Desk Reviews*	On-site M&V
12	9

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 SCORE/CitySmart MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made several adjustments to the claimed savings for seven projects. Two projects resulted in adjustments of less than two percent. The remaining five projects had an adjustment of greater than five percent and further details are provided below.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID # 842152, 843841, 844607, 844879, and 845200: The desk reviews of these five projects found that claimed savings are based on a custom whole building M&V

approach, which included behavioral savings at 75 educational type facilities across three major independent schools districts that participated in the Commercial Behavior-Based program that began in PY2015. The EM&V team identified concerns with regard to the savings methodology used, lack of program and site specific documentation provided, and assumptions for these program measures. Due to limited post-retrofit measurement data at the time of program savings, the EM&V team recommended that savings for PY2015 be based on 40 percent of the initial estimates and that the remaining project savings be determined in PY2016, once full post implementation data sets are available. These updates to the project savings resulted in a 60 percent decrease in the evaluated savings from the initial reported savings. The EM&V team confirmed that the utility corrected the PY2015 claimed savings within the tracking system, which resulted in a 100 percent realization rate for the projects energy savings and demand reduction. These sites did not receive any on-site M&V visits for this impact report. However, on-sites are planned in 2016 to provide additional process and impact feedback for the PY2016 claimed savings true-up.

Project ID # 846396: The EM&V team found the project was identified as a deemed savings methodology within the tracking data. However, during the desk review, the project was found to be assuming custom hours of use and coincidence factors. Initially there was inadequate documentation provided within the project folder to justify the custom facility hours and coincidence assumptions and a 14 decrease in demand reduction resulted. However, based on further documentation provided, the EM&V team was able to validate the custom assumptions, which ultimately resulted in a 100 percent realization rate for the projects energy savings and demand reduction. This site did not receive an on-site M&V visit.

Project ID # 864830: The desk review of this project found that claimed savings are based on a custom whole building M&V approach, which included savings for multiple measures at an educational type facility. The EM&V team identified concerns with regard to the savings methodology used, lack of project and equipment specific documentation, and assumptions for the project measures. Currently, the savings for PY2015 are based on 40 percent of the initial estimates and that the remaining project savings will be determined in PY2016. The EM&V team has accepted these initial savings estimates, however recommends that adjustments to the savings methodology and approach are taken for the final PY2016 savings determinations. This site did not receive any on-site M&V visits.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for 9 of the 9 sites that had desk reviews completed because sufficient documentation was provided for the sites. In order to receive sufficient documentation, the EM&V team went back to the implementation contractor and requested additional documentation beyond what was initially provided for multiple sites. Information of particular assistance included details regarding custom assumptions and methodologies. Since sufficient documentation was provided for 100 percent of the sampled sites, the program documentation score for these estimates is Good.

5.3 DETAILED FINDINGS—RESIDENTIAL (HIGH/MEDIUM EVALUATION PRIORITY)

5.3.1 Residential Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	18.3%	3,315	3,255	98.2%
Energy Savings (kWh)	30.2%	11,999,108	11,869,878	98.9%

Completed Desk Reviews*	On-site M&V
35	0

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

Evaluated savings for the Entergy Residential SOP were 3,255 kW and 11,869,878 kWh, with realization rates of 98 percent and 99 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at two levels:

- Data review, to check that tracking system data are aligned with deemed savings in the technical reference manual
- Desk review, to check that measure data collected by contractors on forms aligns correctly with that in the tracking system.

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process. The evaluation team's desk-review based adjustments to the data review savings are analogous to the utility modifications.

Details on data and desk review realization rates are provided below.

A. Data review

The data review realization rates are 98 percent and 99 percent for demand reduction and energy savings, respectively. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are 98 and 99 percent for demand reduction and energy savings, respectively, indicating that the program tracking data are fairly consistent with the values in the TRM. However, several minor factors led to the differences between tracking and evaluated savings.

Ducting Efficiency, Pre-leakage Cap. TRM V2.1 contains an eligibility requirement for the duct efficiency improvement measure, the application of which led to a difference in reported and evaluated savings for several measures. The TRM applies a cap to the initial leakage rate against which contractors can claim savings. For homes with an initial leakage rate greater than 35 percent of total fan flow, savings will be awarded with respect to this cap rather than the initial leakage.

Ducting Efficiency, HVAC Efficiency values. TRM V2.1 specifies default values for SEER and HSPF of 13 and 7.7, respectively, to provide an average equipment efficiency used in savings calculations across projects. In some cases, the *ex-ante* savings appear to be calculated based on actual efficiency values in place of the defaults. Currently, the TRM does not provide guidance on using actuals; however, given the potential for selectively applying actual efficiencies, and other TRM precedents with regard to the use of "default" values, the EM&V team applied efficiency defaults consistently across all ducting sealing calculations, resulting in a difference in reported and evaluated savings.

In the EM&V team's discussion with PUCT staff, the utilities and implementation contractors regarding this issue, it was agreed to not recommend utility claimed savings adjustments based on these differences, but instead use the PY2015 evaluation results to inform a discussion on whether actual or default values should be used consistently. Additional guidance will then be included in the PY2017 TRM.

Ex-ante listed as 0. For a small number of measures the *ex-ante* value was listed as 0, however the EM&V team were able to calculate savings for the measure based on the tracking data provided. This results in an increase in the realization rate.

Differences in rounding. The team identified minor differences between *ex-ante* and *ex-post* savings due to rounding. With the exception of duct sealing and pipe wrap measures, which indicated rounding differences of up to 0.004 kW per measure, all identified variations due to rounding were within 1 kWh and 0.001 kW.

B. Desk review

Desk reviews were completed for 35 projects, and resulted in desk review realization rates of 100 percent for both demand reduction and energy savings. The EM&V team identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for one of the projects. The team noted the following transcription error:

- The post-leakage CFM for one air infiltration project did not match the value in the project documentation. This resulted in a minor increase in the realization rate.

C. Documentation

Documentation was requested for a total of 45 sites through the supplemental data request. All 45 of these sites provided sufficient documentation for review. Since sufficient

documentation was provided for more than 90 percent of the sampled sites, the program documentation score for these estimates is Good.

5.3.2 Hard-to-Reach Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	6.0%	1,094	1,072	98.0%
Energy Savings (kWh)	9.7%	3,835,575	3,783,852	98.7%

Completed Desk Reviews*	On-site M&V
0	0

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

Evaluated savings for the Hard-to-Reach SOP were 1,072 kW and 3,783,852 kWh, with realization rates of 98 percent and 99 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made through the data review, to check that tracking system data are aligned with deemed savings in the technical reference manual.

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and *ex-ante*), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data review realization rates are provided below.

A. Data review

The data review realization rates are 98 percent and 99 percent for demand reduction and energy savings, respectively. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are 98 percent and 99 percent for demand reduction and energy savings, respectively, indicating that the program tracking data is fairly consistent with the values in the TRM. However, several minor factors led to small differences between tracking and evaluated savings.

Ducting Efficiency, HVAC Efficiency values. TRM V2.1 specifies default values for SEER and HSPF of 13 and 7.7, respectively, to provide an average equipment efficiency used in savings calculations across projects. In some cases, the *ex-ante* savings appear to be calculated based on actual efficiency values in place of the defaults. Currently, the TRM does not provide guidance on using actuals; however, given the potential for selectively applying actual efficiencies, and other TRM precedents with regard to the use of "default" values, the EM&V team applied efficiency defaults consistently across all ducting sealing calculations, resulting in a difference in reported and evaluated savings. In the EM&V team's discussion with PUCT staff, the uitlities and implementation contractors regarding this issue, it was agreed to not recommend utility claimed savings adjustments based on these differences, but instead use the PY2015 evalation results to inform a discussion on whether actual or default values should be used consistently. Additional guidance will then be included in the PY2017 TRM.

Ex-ante listed as 0. For a small number of measures the *ex-ante* value was listed as 0, however the EM&V team were able to calculate savings for the measure based on the tracking data provided. This results in an increase in the realization rate.

Differences in rounding. The team identified minor differences between *ex-ante* and *ex-post* savings due to rounding. With the exception of duct sealing measures, which indicated rounding differences of up to 0.003 kW per measure, all identified variations due to rounding were within 1 kWh and 0.001 kW.

5.3.3 Entergy Solutions High Performance Homes Market Transformation Program–New Homes

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	9.5%	1,716	1,716	100.0%
Energy Savings (kWh)	10.5%	4,166,672	4,166,672	100.0%

Completed Desk Reviews*	On-site M&V
5	0

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

Evaluated savings for Entergy's ENERGY STAR® Homes MTP were the same as claimed savings, with realization rates for both kW and kWh being 100 percent.

The first phase of impact evaluation the EM&V team completed was a tracking system review. No issues were found during this phase.

The second phase of the impact evaluation was to complete desk reviews for a select sample of projects. In order to complete a comprehensive desk review for this program, the EM&V team requested all project documentation associated with each sampled project, including REM/Rate files, the application, reports of QA/QC or M&V activity if conducted, documentation for how the as-built home compares to the base home, and modeling and energy savings information. What the EM&V team received for each project was the REM/Rate file, a REM/Rate report documenting as-build versus User Defined Reference Home (UDRH) consumption, as well as one Excel file with select baseline home data and one Excel file with the exact same as-built home data. These files were helpful in understanding most of the components going into the as-built home and in providing direct comparison to the baseline home, particularly for analyzing kWh savings. Additionally, as part of our analysis, the EM&V team received the Entergy Solutions High Performance Homes M&V Manual. This information was again helpful in understanding the software used and flow of data in and out of that software, as well as the components going into the as-built home.

Due to the structure of the files received and the limited amount of information provided related to kW savings calculations, the EM&V team was only able to verify Entergy's approach to kW savings (and not the actual kW savings), which appears reasonable as presented in documentation. For PY2016, we suggest continuing discussions focused on demand reduction calculations for new homes. Additionally, the EM&V team's analysis of the 8760 Excel files received suggests there may be an opportunity to claim additional savings for lighting and appliances.

Because sufficient supporting documentation for all sampled homes was received, the program documentation score is Good.

5.4 DETAILED FINDINGS—LOAD MANAGEMENT (HIGH/MEDIUM EVALUATION PRIORITY)

5.4.1 Load Management Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	40.5%	7,320	7,320	100.0%
Energy Savings (kWh)	0.1%	23,533	23,533	100.0%

Completed Desk Reviews*	On-site M&V
0	0

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

The EM&V team evaluated Entergy's Load Management Standard Offer Program by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15

minute increments at the ESIID level. Four load management events occurred during PY2015. The dates and times were:

- July 16, 2015 from 1 p.m. to 2 p.m. (scheduled)
- July 17, 2015 from 1 p.m. to 2 p.m. (scheduled)
- August 7, 2015 from 4 p.m. to 7 p.m. (unscheduled)
- September 24, 2015 from 2 p.m. to 3 p.m. (scheduled)

Entergy supplied the EM&V team with individual participant results for each event and 15 minute interval meter data from which to evaluate savings. Entergy supplied the total PY2015 kW and kWh claimed for the program year, but did not provide the underlying methodology or calculations used to generate the results.

From the meter level data, the EM&V team calculated the average event time usage in kW and average the baseline usage in kW. The baseline average included five time periods: four periods of time from the four prior non-weekend, non-holiday, non-event days during the time of the event and one period of time from the event day for one hour starting two hours prior to the event time start. The EM&V team calculated savings for each of the four events at the ESIID level and then aggregated the savings at the participant level. Average savings for each participant was then calculated based upon the participant's participation in events noted in the files that Entergy provided.

The savings calculated by EM&V team matched the initial savings provided by Entergy at the ESIID level (in kW) as well as at the participant average savings level. Subsequently, Entergy provided updated kW savings for their program, resulting in a difference with the evaluation's initial calculations. The EM&V team sought clarification and learned that Entergy applies the following logic to how participant and event savings are used for claiming program year savings: if the average savings from unscheduled events are higher than the average of all event savings, only the unscheduled event savings are used to claim program year kW savings. When the EM&V team recalculated program kW savings using this updated methodology, the results matched the updated savings provided by Entergy and are reflected in the table, above. In the case of kWh, the EM&V team calculated the sum of all savings across all events, regardless of whether they were scheduled or unscheduled.

Evaluated savings for the Entergy Load Management SOP were 7,320 kW and 23,533 kWh. The realization rate for kW was 100 percent and the realization rate for kWh was 100 percent.

5.5 SUMMARY OF LOW PRIORITY EVALUATION PROGRAMS

Table 5-4 provides a summary of claimed savings for Entergy's low evaluation priority programs in PY2015, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2015 tracking data provided to the EM&V team for the EM&V Database.

Table 5-4. PY2015 Claimed Savings (Low Evaluation Priority Programs)

Program	Program Contribution To Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	Program Contribution To Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)
Entergy Solutions High Performance Homes MTP – Home Performance with ENERGY STAR®	0.4%	76	0.5%	186,675

6. IMPACT EVALUATION RESULTS—ONCOR

This section presents the evaluated savings and cost-effectiveness results for El Paso Electric's 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 only verified through the EM&V Database are included.

6.1 KEY FINDINGS

6.1.1 Evaluated savings

Oncor's evaluated savings for PY2015 are similar to the claimed savings, with 116,552 in demand (kW) and 181,193,132 in energy (kWh) savings. The overall kW portfolio realization rate is 100.6 percent, and the overall kWh portfolio realization rate is 101.3 percent. The realization rate is slightly over one hundred percent due to the tracking system review of the residential sector, where the EM&V team used pre-Quality Asssurance/Quality Control (QA/QC) inspection values, whereas Oncor correctly based claimed savings on the results of its QA/QC inspection. This slight difference was expected and the EM&V team supports Oncor's adjustment of claimed savings from their QA/QC results. Table 6-1 shows the claimed and evaluated demand reduction for Oncor's portfolio and broad customer sector/program categories for PY2015.

Table 6-1. Oncor Program Year 2015 Claimed and Evaluated Gross Demand Reduction

Level of Analysis	Percent Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	2015 Evaluated Demand Reduction (kW)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**115,808**	**116,552**	**100.6%**	**0.0%**
Commercial Sector	16.6%	19,245	19,228	99.9%	0.1%
Residential Sector	30.0%	34,775	35,536	102.2%	N/A
Load Management	47.4%	54,902	54,902	100.0%	N/A
Pilot	5.9%	6,886	6,886	100.0%	N/A

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

Table 6-2 shows the claimed and evaluated energy savings for Oncor's portfolio and broad customer sector/program categories for PY2015.

Table 6-2. Oncor Program Year 2015 Claimed and Evaluated Gross Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)	2015 Evaluated Energy Savings (kWh)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**178,908,115**	**181,193,132**	**101.3%**	**0.1%**
Commercial Sector	50.4%	90,170,515	90,094,714	99.9%	0.1%
Residential Sector	49.5%	88,566,094	90,885,643	102.6%	N/A
Load Management	0.1%	171,505	171,505	100.0%	N/A
Pilot	<0.05%	0	41,270	N/A	N/A

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

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

In program-level realization rates, we have also included a program documentation score of good, fair, or limited as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent–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 score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs and/or high savings programs have been identified. Oncor received a good kW program documentation score and a good kWh program documentation score for PY2015.[15] As program documentation recommendations from the PY2013 EM&V effort are to come into effect in PY2015, the EM&V team did expect program documentation scores to improve between PY2013 and PY2015. However, Oncor has received good program documentation scores since the EM&V effort began and therefore no improvement was needed.

6.1.2 Cost-effectiveness results

Oncor's overall portfolio had a cost-effectiveness of 2.19, or 2.45 excluding low-income programs.

[15] In PY2015, only high and medium priority programs received documentation scores. Therefore, overall documentation scores are based only on high and medium priority programs.

The more cost-effective programs were Commercial SOP and Home Energy Efficiency SOP. The less cost-effective programs were Targeted Weatherization Low Income SOP and Solar PV SOP. All of Oncor's programs passed cost-effectiveness testing.

The lifetime cost of PY2015 evaluated savings was $0.012 per kWh and $18.69 per kW.

Table 6-3. Oncor Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	**2.16**	**2.19**	**1.87**
Total Portfolio excluding low-income programs	**2.42**	**2.45**	**2.09**
Commercial	**2.62**	**2.62**	**2.21**
Commercial SOP (Basic)	3.71	3.71	2.98
Commercial SOP (Custom)	3.32	3.32	2.65
Solar PV SOP	1.30	1.30	1.32
Small Business Direct Install MTP	1.44	1.44	1.37
Residential	**2.40**	**2.46**	**2.09**
Home Energy Efficiency SOP	3.13	3.22	2.51
Solar PV SOP	1.28	1.28	1.23
Hard-to-Reach SOP	1.83	1.86	1.86
Low Income	**1.01**	**1.04**	**1.04**
Targeted Weatherization LI SOP	1.01	1.04	1.04
Load Management	**1.38**	**1.38**	**1.38**
Commercial Load Management SOP	1.38	1.38	1.38
Pilot	**1.51**	**1.51**	**1.51**
Residential Demand Response Pilot MTP	1.51	1.51	1.51

6.2 DETAILED FINDINGS—COMMERCIAL (HIGH/MEDIUM EVALUATION PRIORITY)

6.2.1 Commercial standard offer

A. Commercial Standard Offer Program (Basic)

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	9.9%	11,493	11,478	99.9%
Energy Savings (kWh)	32.8%	58,742,627	58,682,475	99.9%

Completed Desk Reviews*	On-site M&V
31	15

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 Basic CSOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made several adjustments to the claimed savings for eleven projects. Eight projects resulted in adjustments of less than five percent and three projects had adjustments of greater than five percent and for whom further details are provided below.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID #823167: During the desk review of this lighting project, the EM&V team found multiple pre-existing fixtures were coded incorrectly within the lighting calculators inventory. The pre-inspection had clearly indicated that the 32 flourescent fixtures were incorrectly listed as F41EE (four foot, one lamp flourescent) when they were actually F42EE (four foot, two lamp flourescent). Based on these results, the EM&V team updated the project savings, which resulted in a 9 percent increase in the evaluated energy savings and demand reduction from the reported savings. This site did not receive an on-site M&V visit.

Project ID #823170: During the desk review of this lighting project, the EM&V team found multiple pre-existing fixtures were coded incorrectly within the lighting calculators inventory. The pre-inspection had clearly indicated that the nine metal halide fixtures were incorrectly listed as 250 watts when they were actually 175 watt fixtures. Based on these results, the EM&V team updated the project savings, which resulted in a 5 percent

decrease in the evaluated energy savings and demand reduction from the reported savings. This site did not receive an on-site M&V visit.

Project ID #823414: During the on-site M&V visit of this lighting project, the EM&V team found that all metal halide fixtures around exterior of the facility were converted to LED's as reported in post-retrofit ExAnte calculations. However, the ExAnte calculations showed that not all pre-existing metal halide fixtures were replaced one-for-one, and that several metal halide fixtures were still installed and in use. The on-site evaluation found these were indeed removed. The utilities post-inspection was conducted in June 2015, but the site contact confirmed that the project was not completed until July or August 2015. Several of the pre-existing lights identified by Oncor's inspector were likely changed to LED's after the post inspection. Based on these results, the EM&V team updated the project savings, which resulted in a 45 percent increase in the evaluated energy savings and demand reduction from the reported savings.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for 28 of the 31 projects that had desk reviews completed because sufficient documentation was provided. Since sufficient documentation was provided for 90 percent of the sampled projects, the program documentation score for these estimates is Good.

B. Commercial Standard Offer Program (Custom)

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	1.9%	2,254	2,254	100.0%
Energy Savings (kWh)	8.5%	15,219,358	15,219,358	100.0%

Completed Desk Reviews*	On-site M&V
10	5

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 Custom CSOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made no adjustments to any of the savings calculations for the projects reviewed. Therefore, evaluated savings were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for nine of the ten projects that had desk reviews completed because sufficient documentation was provided. Since sufficient documentation was provided for 90 percent of the sampled projects, the program documentation score for these estimates is Good.

6.3 DETAILED FINDINGS—RESIDENTIAL

6.3.1 Residential standard offer

A. Home Energy Efficiency Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	19.6%	22,692	23,301	102.7%
Energy Savings (kWh)	33.2%	59,421,878	61,317,792	103.2%

Completed Desk Reviews*	On-site M&V
0	0

Evaluated savings for the Oncor RSOP were 23,301 kW and 61,317,792kWh, with realization rates of 103 percent for both demand reduction and energy savings.

The realization rates were driven by adjustments to claimed energy and peak savings made through the data review: checking that tracking system data are aligned with deemed savings in the technical reference manual.

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data review realization rates are provided below.

i. Data review

The data review realization rates are 103 percent for both demand reduction and energy savings. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates of approximately 103 percent indicate that the program tracking data are fairly consistent with the values in the TRM. The differences between the tracking and evaluated savings are identified below.

Utility QC adjustments. As discussed above, it is important to note that the data review realization rate is as compared to utility ex-ante savings values, which include adjustments based on the utility's QC process. Utilities may adjust savings due to identification of data or calculation errors as well as QC adjustments following their own internal reviews.

For this program, the EM&V team's comparison of deemed savings values against utilities' QC-adjusted savings values resulted in a small impact on the realization rates for air infiltration, ceiling insulation, central air conditioning, central heat pumps, duct sealing measures, and water heater jackets. This was the main realization rate driver and resulted in an increase in the realization rates for all measures.

Ducting efficiency, pre-leakage cap. TRM V2.1 contains limitations for the duct efficiency improvement measure, the application of which led to a difference in reported and evaluated savings for several measures. The TRM applies a cap to the initial leakage rate against which contractors can claim savings. For homes with an initial leakage rate greater than 35 percent of total fan flow, savings will be awarded with respect to this cap rather than the initial leakage.

For three duct sealing projects, the post-treatment leakage exceeded the maximum pre-treatment leakage after the cap had been applied. Negative ex-ante savings were reported for these projects, however the EM&V team reported savings as zero. This resulted in a small increase in the realization rates.

Ex-ante listed as zero. For a small number of measures the ex-ante value was listed as zero, though did not appear to be a result of the utilty adjustment factors. The EM&V team was able to calculate savings for the measure based on the tracking data provided. This affected air infiltration, ceiling insulation, and duct sealing projects and resulted in an increase in the realization rate. The impact of this discrepancy is small, however, and does not appear to indicate any systematic error.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. All identified variations due to rounding were within 1 kWh and 0.001 kW. This affected five ceiling insulation projects and resulted in a negliglbe effect on the realization rates.

B. Hard-to-Reach Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	6.4%	7,416	7,547	101.8%
Energy Savings (kWh)	11.0%	19,601,569	19,950,487	101.8%

Completed Desk Reviews*	On-site M&V
0	0

Evaluated savings for the Oncor Hard-to-Reach SOP were 7,547 kW and 19,950,487 kWh, with realization rates of 102 percent for both demand and energy.

The realization rates were driven by adjustments to claimed energy and peak savings made through the data review: checking that tracking system data are aligned with deemed savings in the technical reference manual.

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data review realization rates are provided below.

i. Data review

The data review realization rates are 105 percent for energy savings and 110 percent for demand reduction. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are greater than 100 percent, indicating that the program tracking data analysis is not consistent with the TRM measure analysis in some cases. The difference reflected in the data review realization rate is driven by a few factors.

Utility QC adjustments. As discussed above, it is important to note that the data review realization rate is as compared to utility ex-ante savings values, which include adjustments based on the utilities QC process. Utilities may adjust savings due to identification of data or calculation errors as well as QC adjustments following their own internal reviews.

For this program, the EM&V team's comparison of deemed savings values against utilities' QC-adjusted savings values resulted in a small impact on the realization rates for air

infiltration, CFLs, ceiling insulation, and duct sealing measures. This resulted in an increase in the realization rates for all measures and was a main driver affecting the realization rates.

Ex-ante listed as zero. For a small number of measures the ex-ante value was listed as zero, though not as a result of the provided adjustment factors. The EM&V team was able to calculate savings for the measure based on the tracking data provided. This affected air infiltration, ceiling insulation, and duct sealing projects and resulted in an increase in the realization rate. The impact of this discrepancy is small, however, and does not appear to indicate any systematic error.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. All identified variations due to rounding were within 1 kWh and 0.001 kW. This affected 9 projects for the ceiling insulation measure. This had a negligible impact on overall realization rates.

Low-flow showerhead quantity. The team identified one instanced where the ex-ante savings calculation assumed one showerhead, while the tracking data indicated a quantity of zero for this project. This ex-post savings calculation resulted in a decrease of the realization rate for this measure, though had a negligible impact on the overall realization rates.

6.4 DETAILED FINDINGS—LOAD MANAGEMENT (HIGH/MEDIUM EVALUATION PRIORITY)

6.4.1 Commercial Load Management Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	47.4%	54,902	54,902	100.0%
Energy Savings (kWh)	0.1%	171,505	171,505	100.0%

Completed Desk Reviews*	On-site M&V
0	0

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

The EM&V team evaluated the PY2015 Oncor Commercial Load Management Standard Offer Program by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15 minute increments at the ESIID level. A single load management event occurred during PY2015 on June 9, 2015 and lasted three hours. The EM&V team also received detailed calculation spreadsheet worksheets used by Oncor to develop Oncor's kW savings. The EM&V team initially found minor discrepancies between the

results. In collaboration with Oncor, the EM&V team resolved the kW savings discrepancies, which were related to rounding choices.

Oncor's practice, per the TRM, is to select the lowest performing hour of each participant during a load management event. As such, the kW savings are conservative compared to using a participant's average hourly savings during a load management event. This provides certainty of the participant's ability to deliver kW reductions when ERCOT calls an event. However, Oncor uses each hour's savings relative to baseline to calculate kWh savings. The EM&V team used this approach to calculate kWh savings for Oncor's Commercial Load Management SOP.

Evaluated savings for the Oncor Commercial Load Management SOP are 54,902 kW and 171,505 kWh. The realization rate for kW is 100 percent and the realization rate for kWh is 100 percent.

6.5 DETAILED FINDINGS—PILOT (HIGH/MEDIUM EVALUATION PRIORITY)

6.5.1 Residential Demand Response Pilot

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	5.9%	6,886	6,886	100.0%
Energy Savings (kWh)	<0.05%	0	41,270	N/A

Completed Desk Reviews*	On-site M&V
0	0

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

The EM&V team evaluated the PY2015 Oncor Residential Demand Response Pilot Program by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15 minute increments at the ESIID level, presented as kW data. Two load management events occurred during PY2015 – one on June 9, 2015 and one on September 8, 2015. Both events started at 3 p.m. and lasted three hours. The EM&V team also received ESIID specific savings developed by Oncor for each residential participant's events and average performance between both events.

The EM&V team applied the TRM approach using the High 3 of 5 method for developing the baseline. In that method, the event hours for the prior five non-holiday weekdays are analyzed, with the highest three selected and averaged to set the baseline. An adjustment factor is applied to the baseline by analyzing the hours for the baseline days' and event day's average demand two hours prior to the event to account for specific differences that can

occur on event days. The adjustment can be additive or subtractive to the event hour's baseline.

In the initial calculation, the EM&V team found differences between our savings calculations and Oncor's. The EM&V team collaborated with Oncor to identify the sources of differences. The savings differences were attributable to three sources. First, Tetra Tech and Oncor rounded at different steps in the process. Second, and more significantly, in applying the TRM's High 3 of 5 method, Tetra Tech and Oncor discovered differences in their approaches to choosing the three highest load days for the baseline. In the case where two or more potential baseline days had the same load during the event hours, a choice must be made in order to select a day to include in the baseline. This choice impacts the final savings calculation as the adjustment factor in the High 3 of 5 method is partially based on the kW usage during the hours prior to the event on the days chosen for the baseline. As a result, even if the kW usage on a potential baseline day during the event hours was the same as other potential baseline days, the kW usage prior to the event may not have been, which may affect the adjustment factor and the resulting savings. Third, Oncor had a minor spreadsheet error. All sources of discrepancies were resolved: (1) rounding practices were aligned, (2) Tetra Tech adopted Oncor's resolution process of choosing the days closest to the event day if loads on potential baseline days were the same, and (3) Oncor updated its spreadsheet calculations and provided Tetra Tech with a new overall savings number. Tetra Tech and Oncor's new kW savings calculations matched.

Subsequently, Oncor provided an updated claimed savings number (kW). While the EM&V team, and initially Oncor as well, had based their calculations on 15 minute kW meter data rounded to two decimal places, Oncor's final round of calculations used unrounded 15 minute kWh meter level data. The difference between the EM&V team's and Oncor's savings results are due to rounding differences in the initial datasets used by the Oncor and the EM&V team. Other than the initial starting data, both only applyied rounding to an event's overall savings. The EM&V results being shown are those calculated by the EM&V team, though the difference is minor compared to Oncor's result.

The EM&V team calculated 6,878 kW and Oncor calculated 6,886 kW as the average demand reduction between the two events, with the evaluation team finding a 100 percent realization rate despite the minor difference. In the case of kWh, Oncor did not claim any kWh for the program. The EM&V team calculated total kWh savings for the six event hours at 41,270 kWh.

6.6 SUMMARY OF LOW PRIORITY EVALUATION PROGRAMS

Table 6-4 provides a summary of claimed savings for Oncor's low evaluation priority programs in PY2015, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2015 tracking data provided to the EM&V team for the EM&V Database.

Table 6-4. PY2015 Claimed Savings (Low Evaluation Priority Programs)

Program	Program Contribution To Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	Program Contribution To Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)
Small Business Direct Install MTP	1.4%	1,636	4.3%	7,681,422
Solar PV SOP (COM)	3.3%	3,862	4.8%	8,527,109
Solar PV SOP (RES)	2.4%	2,766	3.4%	6,100,630
Targeted Low Income Weatherization Program	1%	1,901	2%	3,442,017

6.6.1 Low Income Weatherization

A. Data review

The data review realization rates are 101 percent and 102 percent for demand reduction and energy savings respectively. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are nearly 100 percent for both demand reduction and energy savings, indicating that the program tracking data is consistent with the values in the TRM. However, several minor factors led to small differences between tracking and evaluated savings.

Pipe insulation, location status. The calculation of energy savings and demand reduction for pipe insulation in the TRM V2.1 depends on the pipes being insulated are in conditioned or unconditioned space. Ex-ante savings were based on the assumption that all treated pipes were located in a conditioned space. The EM&V team leveraged the pipe location tracking data, which included unconditioned spaces, to calculate savings per the TRM V2.1. This affected 20 projects and resulted in an increase in the realization rates for the measure, though had a negligible impact on the overall realization rates.

***Ex-ante* listed as zero.** For a small number of measures the *ex-ante* value was listed as zero, however the EM&V team was able to calculate savings for the measure based on the tracking data provided. This affected a small number of pipe insulation projects. The impact of this discrepancy is small, having a neglible impact on overall realization rates, and does not appear to indicate any systematic error.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. All identified variations due to rounding were within 1 kWh and 0.001 kW. This affected the pipe insulation and duct sealing measures. This had a negligible impact on the overall realization rates.

Low-flow showerhead quantity. The team identified minor differences in the quantities assumed in the ex-ante savings calculation compared to those quantities reported in the tracking data for two showerhead installations. This resulted in a slight increase in the realization rates for the showerhead measure, though had a negligible impact on the overall realization rates.

7. IMPACT EVALUATION RESULTS—SHARYLAND

This section presents the evaluated savings and cost-effectiveness results for Sharyland's 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 only verified through the EM&V Database are included.

7.1 KEY FINDINGS

7.1.1 Evaluated savings

Sharyland's evaluated savings for PY2015 were 600 in demand (kW) and 2,515,302 in energy (kWh) savings. The overall kW and kWh portfolio realization rates are just slightly under 100 percent due to minor residential sector adjustments.

Table 7-1 shows the claimed and evaluated demand reduction for Sharyland's portfolio and broad customer sector/program categories for PY2015.

Table 7-1. Sharyland Program Year 2015 Claimed and Evaluated Gross Demand Reduction

Level of Analysis	Percent Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	2015 Evaluated Demand Reduction (kW)	Realization Rate*	Precision at 90% Confidence
Total Portfolio	**100.0%**	**603**	**600**	**99.4%**	**0.5%**
Commercial Sector	20.0%	121	121	100.0%	0.0%
Residential Sector	79.6%	480	477	99.3%	0.7%
Pilots	0.4%	2	2	100.0%	N/A

*Program-level results should only be viewed qualitatively due to the small sample sizes at the utility-program level.

Table 7-2 shows the claimed and evaluated energy savings for Sharyland's portfolio and broad customer sector/program categories for PY2015.

Table 7-2. Sharyland Program Year 2015 Claimed and Evaluated Gross Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)	2015 Evaluated Energy Savings (kWh)	Realization Rate*	Precision at 90% Confidence
Total Portfolio	**100.0%**	**2,528,355**	**2,515,302**	**99.5%**	**0.3%**
Commercial Sector	33.5%	848,111	848,111	100.0%	0.0%
Residential Sector	66.2%	1,673,181	1,660,129	99.2%	0.5%
Pilots	0.3%	7,063	7,063	100.0%	N/A

*Program-level results should only be viewed qualitatively due to the small sample sizes at the utility-program level.

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

In program-level realization rates, we have also included a program documentation score of good, fair, or limited as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent–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 score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs and/or high savings programs have been identified. Sharyland received a good kW program documentation score and a good kWh program documentation score for PY2015.[16] As program documentation recommendations from the PY2013 EM&V effort are to come into effect in PY2015, the EM&V team did expect program documentation scores to improve between PY2013 and PY2015.

7.1.2 Cost-effectiveness results

Sharyland's overall portfolio had a cost-effectiveness of 2.68, or 2.98 without low-income programs.

The most cost-effective program was Customized Commercial SOP. The least cost-effective program was SCORE Pilot MTP. Several programs had benefit-cost ratios of 0 since they expended funds in 2015 but did not generate any savings. All of Sharyland's programs that produced energy savings passed cost-efectiveness.

The lifetime cost of PY2015 savings was $0.010 per kWh and $14.35 per kW.

[16] In PY2015, only high and medium priority programs received documentation scores. Therefore, overall documentation scores are based only on high and medium priority programs.

Table 7-3. Sharyland Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	**2.70**	**2.68**	**2.28**
Total Portfolio excluding low-income programs	**2.99**	**2.98**	**2.51**
Commercial	**3.47**	**3.47**	**2.95**
Commercial SOP	0.00	0.00	0.00
Customized Commercial MTP	3.58	3.58	3.04
Residential	**2.88**	**2.87**	**2.40**
Residential SOP	3.13	3.12	2.52
Hard-to-Reach SOP	1.93	1.92	1.92
Low Income	**2.78**	**2.65**	**2.65**
Targeted Low Income Weatherization Program	2.78	2.65	2.65
Load Management	**0.00**	**0.00**	**0.00**
Load Management SOP	0.00	0.00	0.00
Pilot	**1.71**	**1.71**	**1.59**
SCORE Pilot MTP	1.71	1.71	1.59

7.2 DETAILED FINDINGS—COMMERCIAL (HIGH/MEDIUM EVALUATION PRIORITY)

7.2.1 Commercial Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	N/A	N/A	N/A	N/A
Energy Savings (kWh)	N/A	N/A	N/A	N/A

Completed Desk Reviews*	On-site M&V
N/A	N/A

The PY2015 evaluation activities found that Sharyland did not report any energy or demand reduction for its Commercial Standard Offer Program.

7.2.2 Customized Commercial Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	20.0%	121	121	100.0%
Energy Savings (kWh)	33.5%	848,111	848,111	100.0%

Completed Desk Reviews*	On-site M&V
2	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.

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 Customized Commercial MTP evaluation efforts focused on desk reviews and on-site M&V. As the program only had two participants in PY2015, the EM&V completed a census review. No sample was needed for selection of the two desk reviews and on-site M&V projects for this program as listed above.

The EM&V team made an adjustment to the claimed savings for one project. This project resulted in an adjustment greater than five percent and further details are provided below.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID # 847929: During the desk review and on-site M&V visit, the EM&V team found this lighting project had installed and claimed savings for custom LEDs that are not DLC qualified. Based on these results, the EM&V team removed these LEDs from the savings calculations and updated the project savings, which resulted in a five percent decrease in the evaluated energy savings and demand reduction from the reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which ultimately resulted in a 100 percent realization rate for the project's energy savings and demand reduction.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for two of the two projects that had a desk reviews completed because sufficient documentation was provided. In order to receive sufficient documentation, the EM&V team went back to the implementation contractor and requested additional documentation beyond what was initially provided, specifically the make and model information for custom lighting fixtures for one project. As sufficient documentation was provided for 100 percent of the sampled projects, the program documentation score for these estimates is Good.

7.3 DETAILED FINDINGS—RESIDENTIAL (HIGH/MEDIUM EVALUATION PRIORITY)

7.3.1 Residential standard offer

A. Residential Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	61.8%	373	370	99.4%
Energy Savings (kWh)	53.3%	1,346,478	1,339,181	99.5%

Completed Desk Reviews*	On-site M&V
35	0

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

Evaluated savings for the Sharyland RSOP were 370 kW and 1,339,181 kWh, with realization rates of 99 percent for demand reduction and just under 100 percent for energy savings.

The realization rates were driven by adjustments to claimed energy and peak savings made at two levels:

- Data review, to check that tracking system data are aligned with deemed savings in the technical reference manual
- Desk review, to check that measure data collected by contractors on forms aligns correctly with that in the tracking system.

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process. The evaluation team's desk-review -based adjustments to the data review savings are analogous to the utility modifications.

Details on data and desk review realization rates are provided below.

i. Data review

The data review realization rates are approximately 100 percent for both energy savings and demand reduction. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rate was approximately 100 percent, indicating that the program tracking data is mostly consistent with the values in the TRM. The difference reflected in the data review realization rate is driven by several factors.

Utility QC adjustments. As discussed above, it is important to note that the data review realization rate is as compared to utility ex-ante savings values, which include adjustments based on the utility's QC process. Utilities may adjust savings due to identification of data or calculation errors as well as QC adjustments following their own internal reviews.

For this program, the EM&V team's comparison of deemed savings values against the utility's QC-adjusted savings values resulted in a small increase in the realization rates for duct sealing and ceiling insulation measures.

***Ex-ante* listed as zero.** For a small number of measures the ex-ante value was listed as zero, however the EM&V team were able to calculate savings for the measure based on the tracking data provided. This results in an increase in the realization rate for air infiltration measures.

Minor calculation differences. The team observed an additional minor divergence in energy savings for two duct sealing projects. The impact of this discrepancy is small, however, and does not appear to indicate a systematic error. The overall effect was an increase in the energy realization rate.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. With the exception of duct sealing measures, which indicated rounding differences of up to 0.004 kW per measure, all identified variations due to rounding were within 1 kWh and 0.001 kW.

ii. Desk review

Desk reviews were completed for 35 projects and resulted in desk review realization rates of approximately 99 percent for both energy savings and demand reduction. The team identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for only one project. The team noted the following transcription error:

- The pre- R-value for one ceiling insulation project did not match the value in the project documentation. This resulted in a minor decrease in the realization rate.

iii. Documentation

Documentation was requested for a total of 35 sites through the supplemental data request. All 35 of these sites provided sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the program documentation score for these estimates is Good.

B. Hard-to-Reach Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	10.6%	64	64	99.5%
Energy Savings (kWh)	8.1%	204,491	204,491	100.0%

Completed Desk Reviews*	On-site M&V
26	0

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

Evaluated savings for the Sharyland Hard-to-Reach SOP were 64 kW and 204,491 kWh, with realization rates of 100 percent for both demand and energy.

The realization rates were driven by adjustments to claimed energy and peak savings made at two levels:

- Data review, to check that tracking system data are aligned with deemed savings in the technical reference manual
- Desk review, to check that measure data collected by contractors on forms aligns correctly with that in the tracking system.

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process. The evaluation team's desk-review -based adjustments to the data review savings are analogous to the utility modifications.

Details on data and desk review realization rates are provided below.

i. Data review

The data review realization rates are 100 percent, rounded to the nearest percent, for both energy savings and demand reduction. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization is approximately 100 percent, indicating that the program tracking data is consistent with the values in the TRM. However, the team identified minor differences

between ex-ante and ex-post savings due to rounding. With the exception of duct sealing measures, which indicated rounding differences of up to 0.004 kW per measure, all identified variations due to rounding were within 1 kWh and 0.001 kW.

ii. Desk review

Desk reviews were completed for 26 projects and resulted in desk review realization rates of 100 percent and 99 percent for energy savings and demand reduction, respectively. The EM&V team identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for two projects. The team noted the following transcription errors:

- The post-leakage (cfm) value for one duct sealing project did not match the value in the project documentation. This resulted in a minor decrease in the realization rate.
- The heating type for one duct sealing project did not match the type in the project documentation. This resulted in a minor increase in the realization rate.

iii. Documentation

Documentation was requested for a total of 26 sites through the supplemental data request. All 26 of these sites provided sufficient documentation for review. Since sufficient documentation was provided for more than 90 of the sampled sites, the program documentation score for these estimates is Good.

7.4 DETAILED FINDINGS—LOAD MANAGEMENT (HIGH/MEDIUM EVALUATION PRIORITY)

7.4.1 Load Management Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	N/A	N/A	N/A	N/A
Energy Savings (kWh)	N/A	N/A	N/A	N/A

Completed Desk Reviews	On-site M&V
N/A	N/A

The PY2015 evaluation activities found that Sharyland did not report any load impact or energy savings for its Load Management Standard Offer Program.

7.5 DETAILED FINDINGS—PILOT PROGRAMS (HIGH/MEDIUM EVALUATION PRIORITY)

7.5.1 SCORE Pilot Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	0.4%	2	2	100.0%
Energy Savings (kWh)	0.3%	7,063	7,063	100.0%

Completed Desk Reviews	On-site M&V
1	1

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 SCORE Pilot MTP evaluation efforts focused on desk reviews and on-site M&V. As the program only had one participant in PY2015, the EM&V completed a census review. No sample was needed for selection of the one desk review and on-site M&V project for this program as listed above.

The EM&V team made no adjustments to any of the savings calculations for the projects reviewed. Therefore, evaluated savings were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for the one project that had a desk review completed because sufficient documentation was provided. Since sufficient documentation was provided for 100 percent of the sampled projects, the program documentation score for these estimates is Good.

7.6 SUMMARY OF LOW PRIORITY EVALUATION PROGRAMS

Table 7-4 provides a summary of claimed savings for Shayland's low evaluation priority programs in PY2015, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2015 tracking data provided to the EM&V team for the EM&V Database.

Table 7-4. PY2015 Claimed Savings (Low Evaluation Priority Programs)

Program	Program Contribution To Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	Program Contribution To Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)
Targeted Low Income Weatherization Program	7.2%	44	4.8%	122,212

7.6.1 Low Income Weatherization

A. Data review

The data review realization rates are 98 and 95 percent for demand reduction and energy savings respectively. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are 98 and 95 percent for demand reduction and energy savings respectively, indicating that the program tracking data is very consistent with the values in the TRM. However, several minor factors led to small differences between tracking and evaluated savings.

Refrigerators. TRM V2.1 specifies that in order to calculate refrigerator savings for early retirement the annual energy consumption of the replaced unit is required. This information was not provided in the utilty tracking data for this program and could not be used to calculate savings. For this reason, the team estimated ex-post savings based on calculations for replace on burnout measures. This results in a low realization rate for refrigerator measures.

Minor calculation differences. The team observed additional minor divergences in energy savings and demand reduction for a window AC measure that may stem from data input or calculation errors. The impact of these discrepancies is small, however, and does not appear to indicate any systematic error.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. All identified variations due to rounding were within 1 kWh and 0.007 kW

8. IMPACT EVALUATION RESULTS—SOUTHWESTERN ELECTRIC POWER COMPANY

This section presents the evaluated savings and cost-effectiveness results for SWEPCO's 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 only verified through the EM&V Database are included.

8.1 KEY FINDINGS

8.1.1 Evaluated savings

SWEPCO's evaluated savings for PY2015 were 9,893 in demand (kW) and 15,417,464 in energy (kWh) savings. Both the kW and kWh realization rates are slightly above 100 percent. Table 8-1 shows the claimed and evaluated demand reduction for SWEPCO's portfolio and broad customer sector/program categories for PY2015.

Table 8-1. SWEPCO Program Year 2015 Claimed and Evaluated Gross Demand Reduction

Level of Analysis	Percent Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	2015 Evaluated Demand Reduction (kW)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**9,876**	**9,893**	**100.2%**	**0.4%**
Commercial Sector	14.8%	1,461	1,465	100.3%	0.0%
Residential Sector	25.6%	2,532	2,545	100.5%	1.7%
Load Management	59.5%	5,883	5,883	100.0%	0.0%

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

Table 8-2 shows the claimed and evaluated energy savings for SWEPCO's portfolio and broad customer sector/program categories for PY2015.

Table 8-2. SWEPCO Program Year 2015 Claimed and Evaluated Gross Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)	2015 Evaluated Energy Savings (kWh)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**15,261,951**	**15,417,464**	**101.0%**	**1.0%**
Commercial Sector	51.8%	7,879, 012	7,931,416	100.7%	0.0%
Residential Sector	47.8%	7,322,547	7,425,656	101.4%	2.1%
Load Management	0.4%	60,392	60,392	100.0%	0.0%

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

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

In program-level realization rates, we have also included a program documentation score of good, fair, or limited as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent–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 score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs and/or high savings programs have been identified. SWEPCO received a good kW program documentation score and a fair kWh program documentation score for PY2015.[17] As program documentation recommendations from the PY2013 EM&V effort are to come into effect in PY2015, the EM&V team did expect program documentation scores to improve between PY2013 and PY2015, with which SWEPCO fully complied. We would like to particularly note and thank SWEPCO for their work to successfully improve CSOP program documentation scores.

8.1.2 Cost-effectiveness results

SWEPCO's overall portfolio had a cost-effectiveness of 2.65.

The more cost-effective programs were Commercial SOP and Commercial Solutions MTP. The less cost-effective programs were CoolSaver A/C Tune-Up MTP and Open MTP. The All of SWEPCO's programs were cost effective.

[17] In PY2015, only high and medium priority programs received documentation scores. Therefore, overall documentation scores are based only on high and medium priority programs.

The lifetime cost of PY2015 evaluated savings was $0.011 per kWh and $17.02 per kW.

Table 8-3. SWEPCO Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	**2.63**	**2.65**	**2.27**
Commercial Sector	**2.74**	**2.76**	**2.32**
Commercial Solutions MTP	3.13	3.20	2.72
Commercial SOP	4.01	4.01	3.20
Open MTP	1.17	1.17	1.06
SCORE MTP	1.98	2.00	1.86
Residential Sector	**2.59**	**2.62**	**2.26**
CoolSaver A/C Tune-Up MTP	1.12	1.12	1.01
Home Energy Checkup	n/a	n/a	n/a
Residential SOP	3.05	3.10	2.41
Hard-to-Reach SOP	2.37	2.40	2.40
Load Management	**2.13**	**2.13**	**2.13**
Load Management SOP	2.13	2.13	2.13

8.2 DETAILED FINDINGS—COMMERCIAL (HIGH/MEDIUM EVALUATION PRIORITY)

8.2.1 Commercial Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	6.3%	625	623	99.8%
Energy Savings (kWh)	24.9%	3,794,817	3,786,923	99.8%

Completed Desk Reviews*	On-site M&V
10	4

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 CSOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made an adjustment to the claimed savings for one project. This project had an adjustment of less than one percent. Therefore, evaluated savings overall were not significantly impacted and nearly equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for 10 of the 10 projects that had desk reviews completed because sufficient documentation was provided for the sites. Since sufficient documentation was provided for 100 percent of the sampled projects, the program documentation for these estimates is Good.

8.2.2 Commercial market transformation programs

A. SCORE Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	3.1%	309	308	99.6%
Energy Savings (kWh)	6.9%	1,051,403	1,067,064	101.5%

Completed Desk Reviews*	On-site M&V
5	2

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 SCORE MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made several adjustments to the claimed savings for three projects. One project resulted in adjustments of less than one percent and two projects had adjustments of greater than five percent. Further details are provided below.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID #800734: During the desk review, the EM&V team found omitted information for two of the three roofs at a project site where multiple buildings on the property completed

roofing retrofits. For two of the buildings, an existing insulation layer of fiberglass or similar insulation on both pre-project roofs was identified as omitted in both the pre and post retrofit roof conditions. Adding this layer back into the savings calculations reduced the overall savings for both buildings as compared to initial claimed savings. Based on these results, the EM&V team updated the project savings, which resulted in an 11 percent decrease in the evaluated energy savings from the reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which ultimately resulted in a 100 percent realization rate for the projects energy savings and demand reduction. This site did not receive an on-site M&V visit.

Project ID #865671: During the desk review and on-site M&V visit, the EM&V team found errors in the rated efficiencies of multiple units and a change in the recorded baseline fuel type for this HVAC replacement project. The small commercial HVAC units (less than 5 tons), had field verified voltages that varied from those reported, yielding a slight increase in efficiency and overall caused demand reduction for the project to be higher than reported. In addition, several of the baseline units were reported as heat pumps but had model numbers indicating gas heat and gas service was confirmed during the on-site visit. This change significantly decreased the baseline equivalent full load hours (for electricity usage) for these units. Based on these results, the EM&V team updated the project savings, which resulted in over 40 percent decrease in the evaluated energy savings from the reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which ultimately resulted in a 100 percent realization rate for the projects energy savings and demand reduction.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for five of the five sites that had desk reviews completed because sufficient documentation was provided for the sites. In order to receive sufficient documentation, the EM&V team went back to the implementation contractor and requested additional documentation beyond what was initially provided for one project. Information of particular assistance included photographic documentation depicting pre-existing conditions of the project. Since sufficient documentation was provided for 100 percent of the sampled sites, the program documentation score for these estimates is Good.

B. Commercial Solutions Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	3.2%	313	319	102.0%
Energy Savings (kWh)	14.0%	2,138,986	2,183,619	99.7%

Completed Desk Reviews*	On-site M&V
5	2

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made several adjustments to the claimed savings for two projects. One project resulted in adjustments of less than one percent and one project had adjustments of greater than five percent and further details are provided below.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID #863413: The EM&V team found the project was identified as a deemed savings methodology within the tracking data. However, during the desk review and on-site M&V visit, the project was found to be assuming custom hours of use and coincidence factors. The EM&V team found there was adequate metering results and documentation provided within the project folder to justify the custom assumptions that are key drivers of the project savings. During the on-site visit, the EM&V team found an error in the reported air conditioning type for the majority of the building and four additional fixtures were found installed in a portion of the building. The EM&V team field verified the building space was not conditioned except for the office areas. This was adjusted from medium temperature refrigeration originally reported. These changes nearly eliminated the interactive effects savings, thus decreasing the overall energy savings and demand reduction over 20 percent from the reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system for the air conditioning and custom hours and coincidence, which ultimately resulted in a 98 percent realization rate for the projects energy savings and demand reduction.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for five of the five sites that had desk reviews

completed because sufficient documentation was provided for the sites. Since sufficient documentation was provided for 100 percent of the sampled sites, the program documentation score for these estimates is Good.

8.3 DETAILED FINDINGS—RESIDENTIAL (HIGH/MEDIUM EVALUATION PRIORITY)

8.3.1 Residential Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	14.7%	1,452	1,449	99.8%
Energy Savings (kWh)	28.1%	4,290,425	4,383,716	102.2%

Completed Desk Reviews*	On-site M&V
34	0

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

Evaluated savings for the RSOP were 1,449 kW and 4,383,716 kWh, with realization rates of 100 percent and 102 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at two levels:

- Data review, to check that tracking system data are aligned with deemed savings in the technical reference manual
- Desk review, to check that measure data collected by contractors on forms aligns correctly with that in the tracking system

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data and desk review realization rates are provided below.

A. Data review

The data review realization rates are 99 percent for both demand reduction and energy savings. The EM&V team applied the deemed savings reflected in TRM Version 1.0 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most

recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rate is 99 percent, indicating that the program tracking data is very consistent with the values in the TRM. However, several minor factors led to small differences between tracking and evaluated savings.

Ducting Efficiency, Pre-leakage Cap. TRM V2.1 contains an eligibility requirement for the duct efficiency improvement measure, the application of which led to a difference in reported and evaluated savings for several measures. The TRM applies a cap to the initial leakage rate against which contractors can claim savings. For homes with an initial leakage rate greater than 35 percent of total fan flow, savings will be awarded with respect to this cap rather than the initial leakage.

Ducting Efficiency, HVAC Efficiency values. TRM V2.1 specifies default values for SEER and HSPF of 13 and 7.7, respectively, to provide an average equipment efficiency used in savings calculations across projects. In some cases, the ex-ante savings appear to be calculated based on actual efficiency values in place of the defaults. Currently, the TRM does not provide guidance on using actuals; however, given the potential for selectively applying actual efficiencies, and other TRM precedents with regard to the use of "default" values, the EM&V team applied efficiency defaults consistently across all ducting sealing calculations, resulting in a difference in reported and evaluated savings.

In the EM&V team's discussion with PUCT staff, the utilities and implementation contractors regarding this issue, it was agreed to not recommend utility claimed savings adjustments based on these differences, but instead use the PY2015 evaluation results to inform a discussion on whether actual or default values should be used consistently. Additional guidance will then be included in the PY2017 TRM.

Ex-ante listed as 0. For a small number of measures the ex-ante value was listed as 0, however the EM&V team were able to calculate savings for the measure based on the tracking data provided. This results in an increase in the realization rate.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. With the exception of duct sealing measures, which indicated rounding differences of up to 0.003 kW per measure, all identified variations due to rounding were within 1 kWh and 0.001 kW.

Minor calculation differences. The team observed an additional minor divergence in energy savings and demand reduction for one duct sealing measure that may stem from data input or calculation errors. The impact of this discrepancy is small, however, and does not appear to indicate any systematic error. The overall effect was a decrease in the realization rate.

B. Desk review

Desk reviews were completed for 34 projects, and resulted in desk realization rates of 101 percent and 103 percent for demand reduction and energy savings, respectively. The EM&V team identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for one of the projects. The team noted the following transcription error:

- The AC tonnage for one duct sealing project did not match the value in the project documentation. This resulted in a minor increase in the realization rate.

C. Documentation

Documentation was requested for a total of 35 sites through the supplemental data request. Of these sites, documentation was provided for 35, of which 34 had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the program documentation score for these estimates is Good.

8.3.2 Hard-to-Reach Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	8.5%	837	854	102.0%
Energy Savings (kWh)	16.2%	2,464,948	2,474,766	100.4%

Completed Desk Reviews*	On-site M&V
12	0

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

Evaluated savings for the Hard-to-Reach SOP were 854 kW and 2,474,766 kWh, with realization rates of 102 percent and 100 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at two levels:

- Data review, to check that tracking system data are aligned with deemed savings in the technical reference manual
- Desk review, to check that measure data collected by contractors on forms aligns correctly with that in the tracking system

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data and desk review realization rates are provided below.

A. Data review

The data review realization rates are 98 percent and 99 percent for demand reduction and energy savings, respectively. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rate is very close to 100 percent, indicating that the program tracking data is very consistent with the values in the TRM. The minor difference reflected in the data review realization rate is driven by several factors.

Ducting Efficiency, HVAC Efficiency values. TRM V2.1 specifies default values for SEER and HSPF of 13 and 7.7, respectively, to provide an average equipment efficiency used in savings calculations across projects. In some cases, the *ex-ante* savings appear to be calculated based on actual efficiency values in place of the defaults. Currently, the TRM does not provide guidance on using actuals; however, given the potential for selectively applying actual efficiencies, and other TRM precedents with regard to the use of "default" values, the EM&V team applied efficiency defaults consistently across all duct sealing calculations, resulting in a difference in reported and evaluated savings.

***Ex-ante* listed as 0.** For a small number of measures the *ex-ante* value was listed as 0, however the EM&V team were able to calculate savings for the measure based on the tracking data provided. This results in an increase in the realization rate.

Utility QC adjustments. As discussed above, it is important to note that the data review realization rate is as compared to utility ex-ante savings values, which include adjustments based on the utilities' QC process. Utilities may adjust savings due to identification of data or calculation errors as well as QC adjustments following their own internal reviews.

For this program, the EM&V team's comparison against utilities' QC-adjusted savings values resulted in a small impact on the realization rate for infiltration reduction. The overall effect was an increase in the realization rate.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. With the exception of duct sealing measures, which indicated rounding differences of up to 0.015 kW per measure, all identified variations due to rounding were within 1 kWh and 0.001 kW.

Minor calculation differences. The team observed additional minor divergences in energy savings and demand reduction for a small number of duct sealing, ceiling insulation, and infiltration reduction measures that may stem from data input or calculation errors. The impact of these discrepancies is small, however, and does not appear to indicate any systematic error. The overall effect was an increase in the realization rate.

B. Desk review

Desk reviews were completed for 12 projects, and resulted in desk realization rates of 104 percent and 102 percent for demand reduction and energy savings, respectively. The EM&V team identified minor discrepancies between the tracking system data and the supporting

documentation, leading to differences in calculated savings for one of the projects. The team noted the following transcription error:

- The pre-R-value for one ceiling insulation project did not match the value in the project documentation. This resulted in a minor increase in the realization rate.

C. Documentation

Documentation was requested for a total of 12 sites through the supplemental data request. All 12 of these sites provided sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the program documentation score for these estimates is Good.

8.4 DETAILED FINDINGS—LOAD MANAGEMENT (HIGH/MEDIUM EVALUATION PRIORITY)

8.4.1 Load Management Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	59.6%	5,883	5,883	100.0%
Energy Savings (kWh)	0.4%	60,392	60,392	100.0%

Completed Desk Reviews*	On-site M&V
0	0

The EM&V team evaluated SWEPCO's Load Management Standard Offer Program by applying the TRM calculation methodology to interval meter data. The EM&V team received meter data in 15 minute increments at the ESIID level. Three load management events occurred during PY2015. The dates and times were:

- July 27, 2015 from 2 p.m. to 6 p.m.
- July 29, 2015 from 2 p.m. to 6 p.m.
- August 10, 2015 from 2 p.m. to 6 p.m.

The EM&V team analyzed the meter level data, calculating savings by following the TRM methodology. The evaluation team's calculated savings for the seven participants, across eight sites, aligned with the savings reported by SWEPCO to the evaluation team. One participant did not participate in one of the events, but all other participants participated in all three events. The EM&V team developed kWh savings by analyzing the individual hourly performance of each participant during the events and summing the results.

Evaluated savings for the SWEPCO Load Management SOP 5,883 kW and 60,392 kWh. The realization rate for both kW and kWh are 100 percent.

8.5 SUMMARY OF LOW PRIORITY EVALUATION PROGRAMS

Table 8-4 provides a summary of claimed savings for SWEPCO's low evaluation priority programs in PY2015, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2015 tracking data provided to the EM&V team for the EM&V Database.

Table 8-4. PY2015 Claimed Savings (Low Evaluation Priority Programs)

Program	Program Contribution To Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	Program Contribution To Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)
Open MTP	2.2%	215	5.8%	893,307
CoolSaver℠ A/C Tune-Up MTP	2.5%	242	3.7%	567,174

9. IMPACT EVALUATION RESULTS—TEXAS NEW MEXICO POWER COMPANY

This section presents the evaluated savings and cost-effectiveness results for Entergy's 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 only verified through the EM&V Database are included.

9.1 KEY FINDINGS

9.1.1 Evaluated savings

TNMP's evaluated savings for PY2015 were 8,660 in demand (kW) and 17,441,009 in energy (kWh) savings. Both the overall kW and kWh portfolio realization rates are 100 percent.

Table 9-1 shows the claimed and evaluated demand reduction for TNMP's portfolio and broad customer sector/program categories for PY2015.

Table 9-1. TNMP Program Year 2015 Claimed and Evaluated Gross Demand Reduction

Level of Analysis	Percent Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	2015 Evaluated Demand Reduction (kW)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**8,662**	**8,660**	**100.0%**	**0.0%**
Commercial Sector	23.1%	2,004	2,004	100.0%	0.0%
Residential Sector	33.7%	2,916	2,914	100.0%	0.0%
Load Management	43.2%	3,742	3,742	100.0%	N/A

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

Table 9-2 shows the claimed and evaluated energy savings for TNMP's portfolio and broad customer sector/program categories for PY2015.

Table 9-2. TNMP Program Year 2015 Claimed and Evaluated Gross Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)	2015 Evaluated Energy Savings (kWh)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**17,451,871**	**17,441,009**	**99.9%**	**0.0%**
Commercial Sector	52.7%	9,203,954	9,203,954	100.0%	0.0%
Residential Sector	47.2%	8,244,175	8,233,312	99.9%	0.0%
Load Management	0.0%	3,742	3,742	100.0%	N/A

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

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

In program-level realization rates, we have also included a program documentation score of good, fair, or limited as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent–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 score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs and/or high savings programs have been identified. TNMP received a good kW program documentation score and a good kWh program documentation score for PY2015.[18] As program documentation recommendations from the PY2013 EM&V effort are to come into effect in PY2015, the EM&V team did expect program documentation scores to improve between PY2013 and PY2015.

9.1.2 Cost-effectiveness results

TNMP's overall portfolio had a cost-effectiveness of 2.18, or 2.37 excluding low-income programs.

The more cost-effective programs were New Homes Residential MTP and Commercial Solutions MTP. The less cost-effective programs were Load Management SOP and Open for Small Business MTP. All of TNMP's programs passed cost-effectiveness testing.

The lifetime cost of PY2015 evaluated savings was $0.011 per kWh and $16.92 per kW.

[18] In PY2015, only high and medium priority programs received documentation scores. Therefore, overall documentation scores are based only on high and medium priority programs.

Table 9-3. TNMP Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	**2.18**	**2.18**	**1.85**
Total Portfolio excluding low-income programs	**2.37**	**2.37**	**2.00**
Commercial	**2.29**	**2.29**	**2.04**
Open for Small Business MTP	1.28	1.28	1.15
SCORE/CitySmart MTP	2.67	2.67	2.48
Commercial Solutions MTP	3.02	3.02	2.57
Residential	**2.53**	**2.53**	**2.01**
High Performance New Homes MTP	3.28	3.28	2.30
Residential SOP	2.53	2.53	1.98
Hard-to-Reach SOP	1.81	1.81	1.81
Low Income	**1.81**	**1.77**	**1.77**
Low Income Weatherization	1.81	1.77	1.77
Load Management	**1.45**	**1.45**	**1.45**
Load Management SOP	1.45	1.45	1.45

9.2 DETAILED FINDINGS—COMMERCIAL (HIGH/MEDIUM EVALUATION PRIORITY)

9.2.1 Commercial Solutions Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	7.5%	648	648	100.0%
Energy Savings (kWh)	21.7%	3,790,425	3,790,425	100.0%

Completed Desk Reviews*	On-site M&V
11	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.

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 Commercial Solutions MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made adjustments to the claimed savings for two projects. TNMP responded to the recommended adjustments for both of these projects and therefore final realization rates were 100 percent, which is reflected in the overall program's realization rate.

Details on the initial project specific savings adjustments are listed below by Project ID:

Project ID #863875: During the desk review of this lighting project, the EM&V team identified LED fixtures within the project that were not DLC certified, and for which their demand energy reduction is not included as part of the lighting power density (LPD) or savings calculations. However, the EM&V Team found the project used a 3.8 multiplier instead of the 5 times multiplier per guidance found in the "Nonqualifying LEDs guidance memo final 7 17 2015." Additionally, during the on-site M&V visit, additional lighting fixture quantities were found on-site that were not identified in the reported calculator savings and the applicable gross lighted area was found to be lower than reported. Overall these updates to the project savings calculations resulted in a 27 percent decrease in the evaluated savings from the reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which resulted in a 100 percent realization rate for the projects energy savings and demand reduction.

Project ID #845586: This site had both HVAC and lighting projects. During the desk review, the EM&V team found a tracking data error. The claimed savings within the tracking

data was not reflective of final project savings or documentation. The EM&V team was able to confirm the final caluclators provided were correct from a content perspective and reflective of pre/post inspection findings. The EM&V team made no changes to the final calculators themselves. Based on these results, the EM&V team updated the project savings, which resulted in nine percent decrease in the evaluated energy savings and 11 percent decrease in evaluated demand reduction from the reported savings. The EM&V team confirmed that the utility corrected the claimed savings within the tracking system, which ultimately resulted in a 100 percent realization rate for the projects energy savings and demand reduction.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for 11 of the 11 projects that had desk reviews completed because sufficient documentation was provided. Since sufficient documentation was provided for 100 percent of the sampled projects, the program documentation score for these estimates is Good.

9.2.2 SCORE/CitySmart Market Transformation Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	10.7%	923	923	100.0%
Energy Savings (kWh)	18.5%	3,224,958	3,224,958	100.0%

Completed Desk Reviews*	On-site M&V
10	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.

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 SCORE/CitySmart MTP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made no adjustments to any of the savings calculations for the projects reviewed. Therefore, evaluated savings were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for 10 of the 10 projects that had desk reviews completed because sufficient documentation was provided. Since sufficient

documentation was provided for 100 percent of the sampled projects, the program documentation score for these estimates is Good.

9.3 DETAILED FINDINGS—RESIDENTIAL (HIGH/MEDIUM EVALUATION PRIORITY)

9.3.1 Residential Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	16.7%	1,445	1,446	100.0%
Energy Savings (kWh)	26.9%	4,687,938	4,689,112	100.0%

Completed Desk Reviews*	On-site M&V
0	0

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

Evaluated savings for the TNMP RSOP were 1,446 kW and 4,689,112 kWh, with realization rates of 100 percent for both demand reduction and energy savings.

The realization rates were driven by adjustments to claimed energy and peak savings made through the data review: checking that tracking system data are aligned with deemed savings in the technical reference manual.

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data review realization rates are provided below.

A. Data review

The data review realization rates are 100 percent for both energy savings and demand reduction. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rate is approximately 100 percent, indicating that the program tracking data is consistent with the values in the TRM. The minor difference reflected in the data review realization rate is driven by a few factors.

Ducting efficiency, HVAC efficiency values. TRM V2.1 specifies default values for SEER and HSPF of 13 and 7.7, respectively, to provide an average equipment efficiency used in savings calculations across projects. In some cases, the ex-ante savings appear to be calculated based on actual efficiency values in place of the defaults. Currently, the TRM does not provide guidance on using actuals; however, given the potential for selectively applying actual efficiencies, and other TRM precedents with regard to the use of "default" values, the EM&V team applied efficiency defaults consistently across all ducting sealing calculations, resulting in a difference in reported and evaluated savings.

Ex-ante listed as zero. For a small number of measures the ex-ante value was listed as zero, however the EM&V team were able to calculate savings for the measure based on the tracking data provided. This results in an increase in the realization rate in duct sealing and air infiltration measures.

9.3.2 Hard-to-Reach Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	5.0%	431	431	100.0%
Energy Savings (kWh)	7.0%	1,222,126	1,222,126	100.0%

Completed Desk Reviews*	On-site M&V
0	0

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

Evaluated savings for the TNMP Hard-to-Reach SOP were 431 kW and 1,222,126 kWh, with realization rates of 100 percent for both demand reduction and energy savings.

The realization rates were driven by adjustments to claimed energy and peak savings made through the data review: checking that tracking system data are aligned with deemed savings in the technical reference manual

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data review realization rates are provided below.

A. Data review

The data review realization rates are 100 percent for both demand reduction and energy savings. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rate is approximately 100 percent, indicating that the program tracking data is consistent with the values in the TRM. The minor difference reflected in the data review realization rate is driven by a few factors.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. With the exception of duct sealing measures, which indicated rounding differences of up to 0.004 kW per measure, all identified variations due to rounding were within 1 kWh and 0.001 kW.

Minor calculation differences. The team observed additional minor divergences in energy savings and demand reduction for a small number of duct sealing and pipe wrap measures that may stem from data input or calculation errors. The impact of these discrepancies is small, however, and does not appear to indicate any systematic error. The overall effect was an increase in the realization rate.

9.3.3 High-Performance Homes MTP Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	9.0%	783	783	100.0%
Energy Savings (kWh)	10.5%	1,840,458	1,840,458	100.0%

Completed Desk Reviews*	On-site M&V
3	0

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

Evaluated savings for TNMP's High-Performance Homes MTP were the same as the claimed savings for kW and kWh, with realization rates reflecting 100 percent for both kW and kWh.

The first phase of impact evaluation the EM&V team completed was a tracking system review. No issues were found during this phase.

The second phase of the impact evaluation was to complete desk reviews for a select sample of projects. In order to complete a comprehensive desk review for this program the EM&V team requested all project documentation associated with each sampled project, including the application, reports of QA/QC or M&V activity if conducted, documentation for how the as-built home compares to the base home, and modeling and energy savings information. What the EM&V team received for each project was a REM/Rate[19] file and Fuel Summary Report for each sampled project. We also received the implementer's rated and reference home inputs in an Excel file, which provided additional insight into the modeling process. This information contained critical inputs to calculating savings to allow for comparison and to verify energy savings and incentive payouts.

Across the three desk reviews the EM&V team completed, we did see slight variation in realization rates when assessing only the REM/Rate files (90 percent, on average). Some of this variation could be related to the fact that we do not have access to the Beacon modeling tool in its entirety. However, the EM&V team's attempts at reproducing this program's results come very close, resulting in an overall realization rate of 100 percent for both kW and kWh.

Because the implementer for this program leverages an M&V methodology for calculating savings on a per home basis, the EM&V team worked with both TNMP and the implementer to finalize an M&V methodology that was included with Texas TRM 3.0, Volume 4.

Because sufficient supporting documentation for all sampled homes was received, the program documentation score is Good.

[19] REM/Rate is a residential energy analysis, code compliance, and rating software developed specifically for the needs of Home Energy Rating System (HERS) providers. REM/Rate™ software calculates heating, cooling, hot water, lighting, and appliance energy loads, consumption and costs for new and existing single and multi-family homes. (www.archenergy.com/products/remrate).

9.4 DETAILED FINDINGS—LOAD MANAGEMENT (HIGH/MEDIUM EVALUATION PRIORITY)

9.4.1 Load Management Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	43.2%	3,742	3,742	100.0%
Energy Savings (kWh)	<0.05%	3,742	3,742	100.0%

Completed Desk Reviews*	On-site M&V
0	0

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

The EM&V team evaluated TNMP's Load Management Standard Offer Program by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15 minute increments at the ESIID level. One load management event occurred during PY2015, on June 10, 2015 from 2 p.m. to 3 p.m.

From TNMP, the EM&V team received meter level data covering the event and baseline time periods in 15 minute intervals. Additionally, the EM&V team received savings results for 81 sites across 7 sponsors. The EM&V team analyzed the meter data to calculate site level savings by applying the TRM methodology. The EM&V team compared its site level savings results to those supplied by TNMP. Initially, the savings for 12 of the 81 sites did not match. Upon examination of the differences, TNMP identified the cause. TNMP's initial baseline calculations used meter data which included times 1.5 hours prior to the event, rather than the stated TRM methodology of including event day loads 2 hours prior to the event, which the EM&V team had used. TNMP then updated its calculations to align with the TRM and provided new savings results to the EM&V team. These results matched the EM&V team's results. The evaluation calculation of kWh also matched that of TNMP.

Evaluated savings for the TNMP Load Management SOP were 3,742 kW and 3,742 kWh. The realization rate for kW was 100 percent and the realization rate for kWh was also 100 percent.

9.5 SUMMARY OF LOW PRIORITY EVALUATION PROGRAMS

Table 9-4 provides a summary of claimed savings for TNMP's low evaluation priority programs in PY2015, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2015 tracking data provided to the EM&V team for the EM&V Database.

Table 9-4. PY2015 Claimed Savings (Low Evaluation Priority Programs)

Program	Program Contribution To Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	Program Contribution To Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)
Open for Small Business MTP	5.0%	434	12.5%	2,188,571
Low Income Weatherization	3.0%	258	2.8%	493,653

10. IMPACT EVALUATION RESULTS—XCEL ENERGY SOUTHWESTERN PUBLIC SERVICE COMPANY

This section presents the evaluated savings and cost-effectiveness results for Xcel SPS's 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 only verified through the EM&V Database are included.

10.1 KEY FINDINGS

10.1.1 Evaluated savings

Xcel SPS's evaluated savings for PY2015 were 8,203 in demand (kW) and 14,801,945 in energy (kWh) savings. Both the kW and kWh realization rates were slightly above 100 percent due to adjustments for the RSOP and HTR programs. The primary difference in residential sector savings is due to a difference in the application of stipulated TRM values versus actual field data, which is an issue across multiple utilities. It was agreed the PY2015 evaluation would assess the extent of this issue to inform updates to the PY2017 TRM.

Table 10-1 shows the claimed and evaluated demand reduction for Xcel SPS's portfolio and broad customer sector/program categories for PY2015. Xcel SPS's responsiveness to the EM&V team for a couple of identified savings adjustments also supported the healthy realization rates.

Table 10-1. Xcel SPS Program Year 2015 Claimed and Evaluated Gross Demand Reduction

Level of Analysis	Percent Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	2015 Evaluated Demand Reduction (kW)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**8,166**	**8,203**	**100.5%**	**0.1%**
Commercial Sector	29.6%	2,416	2,417	100.0%	0.0%
Residential Sector	18.3%	1,498	1,534	102.4%	0.4%
Load Management	52.1%	4,252	4,252	100.0%	0.0%

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

Table 10-2 shows the claimed and evaluated energy savings for Xcel SPS's portfolio and broad customer sector/program categories for PY2015.

Table 10-2. Xcel SPS Program Year 2015 Claimed and Evaluated Gross Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2015 Claimed Demand Reduction (kWh)	2015 Evaluated Demand Reduction (kWh)	Realization Rate	Precision at 90% Confidence
Total Portfolio	**100.0%**	**14,536,580**	**14,801,945**	**101.8%**	**1.0%**
Commercial Sector	69.8%	10,149,877	10,177,208	100.3%	0.1%
Residential Sector	29.9%	4,352,698	4,590,732	105.5%	3.2%
Load Management	0.2%	34,004	34,004	100.0%	0.0%

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

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

In program-level realization rates, we have also included a program documentation score of good, fair, or limited as discussed in Section 3. For the overall utility program documentation score, the score of "good" was given if 90 percent or more of the evaluated savings estimates received a score of good or fair due to program documentation received as indicated in detailed program findings. A score of "fair" was given if 70 percent–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 score of good or fair. In general, a score of "good" indicates the utility has established processes to collect sufficient documentation to verify savings; a score of "fair" also indicates established processes with some areas of improvements identified; and a score of "limited" indicates program documentation improvements across more individual programs and/or high savings programs have been identified. Xcel SPS received a good kW program documentation score and a good kWh program documentation score for PY2015.[20] As program documentation recommendations from the PY2013 EM&V effort are to come into effect in PY2015, the EM&V team did expect program documentation scores to improve between PY2013 and PY2015, which Xcel SPS has complied with though there is still a need for improved program documentation in their CSOP.

10.1.2 Cost-effectiveness results

Xcel SPS's overall portfolio had an evaluated cost-effectiveness of 2.61, or 2.87 excluding low-income programs.

The more cost-effective programs were the Large and Small Commercial SOPs. The less cost-effective programs were Load Management SOP and Recommissioning MTP. All of Xcel Energy's programs passed cost-effectiveness.

[20] In PY2015, only high and medium priority programs received documentation scores. Therefore, overall documentation scores are based only on high and medium priority programs.

The lifetime cost of PY2015 evaluated savings was $0.012 per kWh and $18.82 per kW.

Table 10-3. Xcel SPS Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Gross Savings Results	Evaluated Net Savings Results
Total Portfolio	**2.57**	**2.61**	**2.23**
Total Portfolio excluding low-income programs	**2.82**	**2.87**	**2.42**
Commercial Sector	**3.36**	**3.36**	**2.80**
Large Commercial SOP	4.80	4.79	3.88
Small Commercial SOP	3.76	3.75	3.03
Retro-commissioning MTP	1.84	1.84	1.65
Residential Sector	**2.44**	**2.57**	**2.19**
Residential SOP	2.57	2.78	2.17
Hard-to-Reach SOP	2.22	2.22	2.22
Low-Income	**2.27**	**2.27**	**2.27**
Low Income Weatherization	2.27	2.27	2.27
Load Management	**1.13**	**1.13**	**1.13**
Load Management SOP	1.13	1.13	1.13

10.2 DETAILED FINDINGS—COMMERCIAL (HIGH/MEDIUM EVALUATION PRIORITY)

10.2.1 Commercial Standard Offer Program

Impact	Type	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	Large	22.8%	1,862	1,867	100.3%
	Small	1.6%	134	130	97.1%
Energy Savings (kWh)	Large	44.2%	6,429,444	6,461,882	100.5%
	Small	3.7%	532,010	526,903	99.0%

Type	Completed Desk Reviews*	On-site M&V
Large	15	5
Small	10	2

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

*Desk reviews were performed for all sites where on-site M&V was performed to ensure consistency between on-site results and desk review results.

The PY2015 Large CSOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made several adjustments to the claimed savings for four projects. Three projects resulted in adjustments of less than five percent and one project had adjustments of greater than five percent and for whom further details are provided below.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID #868906: During the desk review of this lighting project, the EM&V team found multiple lighting measures were calculated using different fixture quantities than what was reported in the pre and post-inspection documentation. These changes resulted in slightly less savings than those reported in the ex-ante calculator. The largest impact to the realization rate was due to the claimed savings within the tracking data was found not to match the claimed savings within the project documentation. Based on these results, the EM&V team updated the project savings, which resulted in an 81 percent decrease in the evaluated energy savings and demand reduction from the reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which ultimately resulted in a 100 percent realization rate for the projects energy savings and demand reduction. This site did not receive an on-site M&V visit.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for 12 of the 15 projects that had desk reviews completed because sufficient documentation was provided for the sites. In particular, projects that had incomplete documentation included missing invoices, onsite inspection field notes, and/or photos. In addition, two lighting projects had calculators for which the inventory did not adequately describe all space types separately. Detailed inventories should be provided for each space description: building ID, floor, and room descriptions. Since sufficient documentation was provided for 80 percent of the sampled sites, the program documentation score for these estimates is Fair.

The PY2015 Small CSOP evaluation efforts focused on desk reviews and on-site M&V. The sample of completed desk reviews and on-site M&V projects for this program are listed above.

The EM&V team made several adjustments to the claimed savings for five projects. Three projects resulted in adjustments of less than five percent and two projects had adjustments of greater than five percent and for whom further details are provided below.

Details on the project specific savings adjustments are listed below by Project ID:

Project ID #800703: During the desk review, the EM&V team found errors in the rated size and efficiencies of multiple units for the HVAC replacement project and incorrect roof area assumed for the Roofing replacement project at this site. The provided HVAC calculator had size ratings in tons, while AHRI certificates provided them in BTUh. Conversions were slightly off. Additionally, the EER rating of one unit was input as 11.0 when it was listed on the AHRI certificate as 11.2. The minor size adjustments and the corrected EER resulted in increased savings of approximately three percent for the HVAC project. The Roofing project included an engineering assessment within the project documentation, however this information was different than the values entered in the Roofing calculator. There were two primary differences noted. First, the entered square footage of the roof was roughly 2,000 square feet smaller than listed in the engineering assessment of the project. Second, the entered pre- and post-project insulation properties (R-values) for the roof were slightly off as well (2.90 vs. 2.825 pre, and 36.07 vs 36.00 for post). Assuming the engineering data to be the most accurate, the Roofing calculator was modified and increased savings realized of approximately 122 percent. Based on these results, the EM&V team updated the project savings, which resulted in overall 117 percent increase in the evaluated energy savings and 116 percent increase in evaluated demand reduction from the reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which ultimately resulted in a 100 percent realization rate for the projects energy savings and demand reduction. This site did not receive an on-site M&V visit.

Project ID #847924: This site had both HVAC and interior/exterior lighting projects. During the desk review and on-site M&V visit, the EM&V team found an error in the selection of the exterior lighting zone. The project initially categorized the exterior lighting projects building type as zone 4, which is defined as *Zone 4: High-activity commercial districts in major metropolitan areas as designated by the local land use planning authority.* The EM&V team found the project site to be in a rural area and is most consistent with the

zone 2 classification, which is defined as *Zone 2: Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use and residential mixed-use areas.* As zone 2 has a lower code required power density, this lowered the baseline usage and reduced project savings. Based on these results, the EM&V team updated the project savings, which resulted in 8 percent decrease in the evaluated energy savings and 5 percent decrease in evaluated demand reduction from the reported savings. The EM&V team confirmed that the utility corrected the calculator and claimed savings within the tracking system, which ultimately resulted in a 100 percent realization rate for the projects energy savings and demand reduction.

In response to this finding, the EM&V team and Xcel SPS met to discuss the exterior lighting zones in the TRM and the best zone for Xcel SPS to use going forward. Specifically, Xcel SPS has several commercial facilities near a highway that have increased operating hours. It was agreed going forward that Zone 3 is the most appropriate selections for these commercial facilities if they do not specifically fit within Zone 2 or Zone 4.

The EM&V team was able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (e.g., wattages, efficiencies, ballast factors, etc.) for three of the seven projects that had desk reviews completed because sufficient documentation was provided for the sites. In particular, projects that had incomplete documentation, included missing documentation beyond the calculator (invoices, onsite inspection field notes, equipment specifications, and photos), and two lighting projects had calculators for which the inventory did not adequately describe all space types separately. Detailed inventories should be provided for each space description: building ID, floor, and room descriptions. Since sufficient documentation was provided for 43 percent of the sampled sites, the program documentation score for these estimates is Limited.

10.3 DETAILED FINDINGS—RESIDENTIAL (HIGH/MEDIUM EVALUATION PRIORITY)

10.3.1 Residential Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	10.2%	830	867	104.5%
Energy Savings (kWh)	16.4%	2,386,697	2,621,620	109.8%

Completed Desk Reviews*	On-site M&V
23	0

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

Evaluated savings for the Xcel SPS Residential SOP were 867 kW and 2,621,620 kWh, with realization rates of 105 percent and 110 percent, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at two levels:

- Data review, to check that tracking system data are aligned with deemed savings in the technical reference manual
- Desk review, to check that measure data collected by contractors on forms aligns correctly with that in the tracking system

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data and desk review realization rates are provided below.

A. Data review

The data review realization rates are 104 percent and 106 percent for demand reduction and energy savings, respectively. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are 104 percent and 106 percent for demand reduction and energy savings, respectively, indicating that the program tracking data is very consistent with

the values in the TRM. However, several minor factors led to small differences between tracking and evaluated savings.

Ducting Efficiency, HVAC Efficiency values. TRM V2.1 specifies default values for SEER and HSPF of 13 and 7.7, respectively, to provide an average equipment efficiency used in savings calculations across projects. In some cases, the ex-ante savings appear to be calculated based on actual efficiency values in place of the defaults. Currently, the TRM does not provide guidance on using actuals; however, given the potential for selectively applying actual efficiencies, and other TRM precedents with regard to the use of "default" values, the EM&V team applied efficiency defaults consistently across all ducting sealing calculations, resulting in a difference in reported and evaluated savings.

Ducting Efficiency, Pre-leakage Cap. TRM V2.1 contains an eligibility requirement for the duct efficiency improvement measure, the application of which led to a difference in reported and evaluated savings for several measures. The TRM applies a cap to the initial leakage rate against which contractors can claim savings. For homes with an initial leakage rate greater than 35 percent of total fan flow, savings will be awarded with respect to this cap rather than the initial leakage.

Utility QC adjustments. As discussed above, it is important to note that the data review realization rate is as compared to utility ex-ante savings values, which include adjustments based on the utility's QC process. Utilities may adjust savings due to identification of data or calculation errors as well as QC adjustments following their own internal reviews.

For this program, the EM&V team's comparison of deemed savings values against the utility's QC-adjusted savings values resulted in a small increase in the realization rates for duct sealing, ceiling insulation, and air infiltration measures.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. With the exception of duct sealing measures, which indicated rounding differences of up to 0.002 kW per measure, all identified variations due to rounding were within 1 kWh and 0.001 kW.

B. Desk review

Desk reviews were completed for 23 projects, and resulted in desk review realization rates of 100 percent and 103 percent for demand reduction and energy savings, respectively. The EM&V identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for one of the projects. The team noted the following transcription error:

- The pre-leakage (cfm) for one air infiltration project did not match the value in the project documentation. This resulted in a minor increase in the realization rate.

C. Documentation

Documentation was requested for a total of 29 sites through the supplemental data request. Of these sites, documentation was provided for 29, of which 23 had sufficient documentation for review. Since sufficient documentation was provided for more than 70 percent of the sampled sites, the program documentation score for these estimates is Fair.

10.3.2 Hard-to-Reach Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	5.4%	444	442	99.7%
Energy Savings (kWh)	8.7%	1,271,605	1,274,717	100.2%

Completed Desk Reviews*	On-site M&V
12	0

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

Evaluated savings for the Xcel SPS Hard-to-Reach SOP were 442 kW and 1,274,717 kWh, with realization rates of 100 percent and 100 percent, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at two levels:

- Data review, to check that tracking system data are aligned with deemed savings in the technical reference manual
- Desk review, to check that measure data collected by contractors on forms aligns correctly with that in the tracking system.

Where utilities provided multiple estimates of savings values (e.g., reported, adjusted, and ex-ante), realization rates are calculated relative to the ex-ante savings. These values may incorporate utility-provided QC adjustments to initial savings calculations based on their own review process.

Details on data and desk review realization rates are provided below.

A. Data review

The data review realization rates are 100 percent for both demand reduction and energy savings. The EM&V team applied the deemed savings reflected in TRM Version 1.0 Volume 2, filed December 13, 2013, which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2015, when TRM Version 2.1 went into effect.

The data review realization rate is 100 percent, rounded to the nearest percentage point, indicating that the program tracking data is very consistent with the values in the TRM. However, several minor factors led to small differences between tracking and evaluated savings.

Ducting Efficiency, HVAC Efficiency values. TRM V2.1 specifies default values for SEER and HSPF of 13 and 7.7, respectively, to provide an average equipment efficiency used in savings calculations across projects. In some cases, the ex-ante savings appear to be calculated based on actual efficiency values in place of the defaults. Currently, the TRM does not provide guidance on using actuals; however, given the potential for selectively applying actual efficiencies, and other TRM precedents with regard to the use of "default" values, the EM&V team applied efficiency defaults consistently across all ducting sealing calculations, resulting in a difference in reported and evaluated savings.

Utility QC adjustments. As discussed above, it is important to note that the data review realization rate is as compared to utility ex-ante savings values, which include adjustments based on the utility's QC process. Utilities may adjust savings due to identification of data or calculation errors as well as QC adjustments following their own internal reviews.

For this program, the EM&V team's comparison of deemed savings values against the utility's QC-adjusted savings values resulted in a small increase in the realization rates for duct sealing, ceiling insulation, air infiltration, and CFL measures.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. With the exception of duct sealing measures, which indicated rounding differences of up to 0.005 kW per measure, all identified variations due to rounding were within 1 kWh and 0.001 kW.

B. Desk review

Desk reviews were completed for 12 projects, and resulted in desk review realization rates of 100 percent for both demand reduction and energy savings. The EM&V team identified no discrepancies between the tracking system data and the supporting documentation.

C. Documentation

Documentation was requested for a total of 12 sites through the supplemental data request. All 12 of these sites provided sufficient documentation for review. Since sufficient documentation was provided for more than 90 of the sampled sites, the program documentation score for these estimates is Good.

10.4 DETAILED FINDINGS—LOAD MANAGEMENT (HIGH/MEDIUM EVALUATION PRIORITY)

10.4.1 Load Management Standard Offer Program

Impact	Program Contribution To Portfolio Savings	2015 Claimed Impact	2015 Evaluated Impact	Realization Rate
Demand Reduction (kW)	52.1%	4,252	4,252	100.0%
Energy Savings (kWh)	0.2%	34,004	34,004	100.0%

Completed Desk Reviews*	On-site M&V
0	0

The EM&V team evaluated the PY2015 Xcel SPS Load Management Standard Offer Program by applying the TRM calculation method to interval meter data. The meter data was supplied in 15 minute increments at the ESIID level. Two load management events occurred during PY2015. The dates and times were:

- August 6, 2015 from 3 p.m. to 7 p.m.
- September 17, 2015 from 3 p.m. to 7 p.m.

In analyzing the meter data for the seven participants across the 14 sites with load data, the EM&V team found that the meter level analysis aligned with the savings reported by Xcel SPS to the EM&V team. Two sites did not have any load data associated with them, as they did not participate in either event. All sponsors had at least one participating site that participated in at least one event. To calculate savings at the site level, Xcel SPS averaged the kW reductions for each event, whether or not the sites participated in both events. In applying this method to the meter level data and following the TRM, the EM&V team calculated kW savings that matched that of Xcel SPS. The EM&V team calculated kWh savings by summing the hourly kW savings for each sponsor and event. The table above shows both the EM&V team and Xcel SPS' calculated kW and kWh savings.

Evaluated savings for the Xcel SPS Load Management SOP are 4,252 kW and 34,004 kWh. The realization rate for kW is 100 percent and the realization rate for kWh is also 100 percent.

10.5 SUMMARY OF LOW PRIORITY EVALUATION PROGRAMS

Table 10-4 provides a summary of claimed savings for Xcel SPS's low evaluation priority programs in PY2015, including programs' overall contribution to portfolio savings. Low priority programs' claimed savings were verified against the final PY2015 tracking data provided to the EM&V team for the EM&V Database.

Table 10-4. PY2015 Claimed Savings (Low Evaluation Priority Programs)

Program	Program Contribution To Portfolio Reduction (kW)	2015 Claimed Demand Reduction (kW)	Program Contribution To Portfolio Savings (kWh)	2015 Claimed Energy Savings (kWh)
Retro-Commissioning MTP	5.1%	420	21.9%	3,188,423
Low-Income Weatherization	2.8%	225	4.8%	694,369

10.5.1 Low Income Weatherization

A. Data review

The data review realization rates are 100 percent for for both demand reduction and energy savings. The EM&V team applied the deemed savings reflected in TRM Version 2.1 Volume 2, filed January 30, 2015 (with Version 2.0 filed on April 17, 2014), which were the most recent deemed savings values available during program implementation. This document was effective until January 1, 2016, when TRM Version 3.1 went into effect.

The data review realization rates are 100 percent for for both demand reduction and energy savings, indicating that the program tracking data is very consistent with the values in the TRM. However, several minor factors led to small differences between tracking and evaluated savings.

Refrigerators. TRM 2.1 specifies that in order to calculate refrigerator savings for early retirement the annual energy consumption of the replaced unit is required. The EM&V team did not have this information when calculating savings. The *ex post* savings are based on savings the refrigerator were to receive if categorized as replace on burnout. This results in a low realization rate for refrigerator measures.

Minor calculation differences. The team observed additional minor divergences in energy savings and demand reduction for a window AC measure that may stem from data input or calculation errors. The impact of these discrepancies is small, however, and does not appear to indicate any systematic error.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding. All identified variations due to rounding were within 1 kWh and 0.001 kW.