



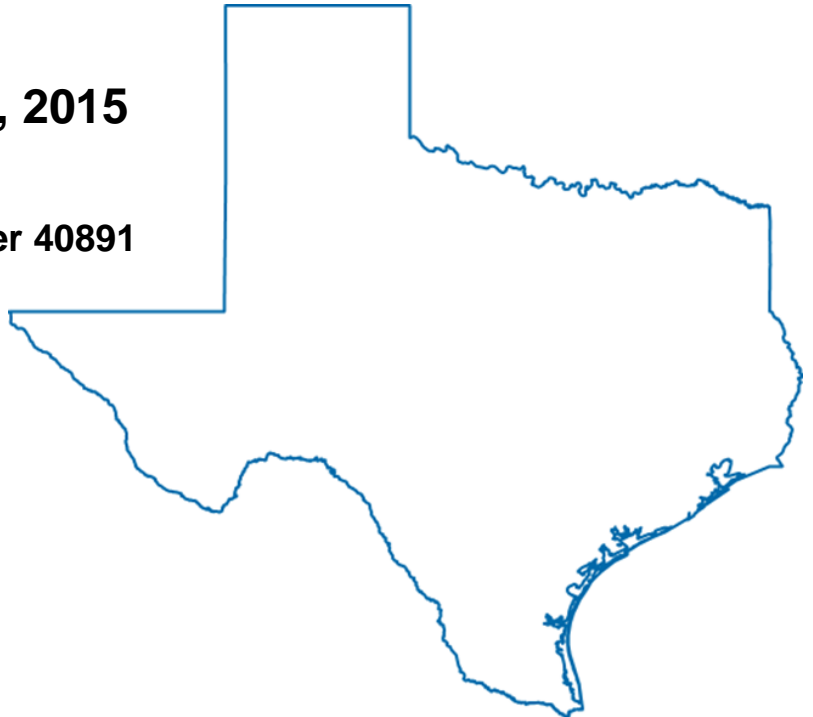
complex world | CLEAR SOLUTIONS™

Public Utility Commission of Texas

Annual Statewide Portfolio Report for Program Year 2014—Volume II

October 16, 2015

Project Number 40891



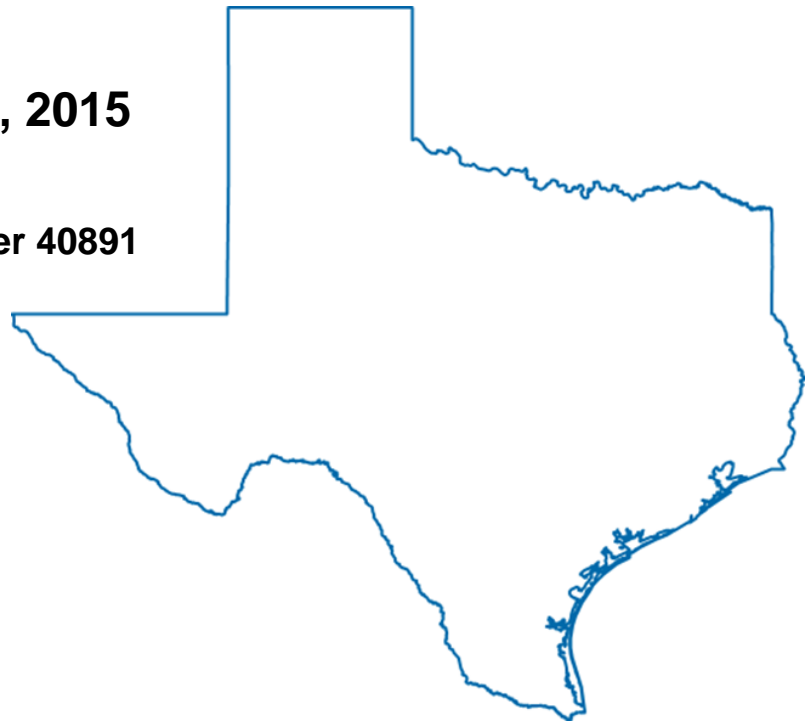


Public Utility Commission of Texas

Annual Statewide Portfolio Report for Program Year 2014—Volume II

October 16, 2015

Project Number 40891



www.tetrattech.com



TABLE OF CONTENTS

1. Impact Evaluation Results—American Electric Power Texas Central Company.....	1-1
1.1 Key Findings	1-1
1.1.1 Evaluated savings	1-1
1.1.2 Cost-effectiveness results	1-2
1.2 Detailed Findings—Commercial	1-3
1.2.1 Commercial Standard Offer Program	1-3
1.2.2 Commercial market transformation	1-4
1.3 Detailed Findings—Residential	1-10
1.3.1 Residential standard offer	1-10
1.3.2 Residential market transformation	1-16
1.3.3 Targeted Low-Income Energy Efficiency Program	1-20
1.4 Detailed Findings—Load Management	1-23
1.4.1 Load Management Standard Offer Program	1-23
1.4.2 Irrigation Load Management Market Transformation Program	1-23
1.5 Detailed Findings—Pilots	1-24
1.5.1 A/C Distributor Pilot Market Transformation Program (Residential)	1-24
2. Impact Evaluation Results—American Electric Power Texas North Company.....	2-1
2.1 Key Findings	2-1
2.1.1 Evaluated savings	2-1
2.1.2 Cost-effectiveness results	2-2
2.2 Detailed Findings—Commercial	2-3
2.2.1 Commercial Standard Offer Program	2-3
2.2.2 Commercial Market Transformation Program	2-6
2.3 Detailed Findings—Residential	2-9
2.3.1 Residential Standard Offer Program	2-9
2.3.2 Hard-to-Reach Standard Offer Program	2-12
2.3.3 Residential market transformation	2-14
2.3.4 Targeted Low-Income Energy Efficiency Program	2-15
2.4 Detailed Findings—Load Management	2-17
2.4.1 Load Management Standard Offer Program	2-17
2.4.2 Irrigation Load Management Market Transformation Program	2-18
2.5 Detailed Findings—Pilots	2-18
2.5.1 A/C Distributor Pilot Market Transformation Program (Residential)	2-18
3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC ...	3-1
3.1 Key Findings	3-1



3.1.1	Evaluated savings	3-1
3.1.2	Cost-effectiveness results	3-3
3.2	Detailed Findings—Commercial	3-4
3.2.1	Commercial standard offer	3-4
3.2.2	Commercial market transformation	3-6
3.3	Detailed Findings—Residential	3-9
3.3.1	Residential Standard Offer Program	3-9
3.3.2	Residential market transformation	3-13
3.3.3	Low-income market transformation	3-19
3.4	Detailed Findings—Load Management	3-22
3.4.1	Large Commercial Load Management Standard Offer Program	3-22
3.5	Detailed Findings—Pilots	3-23
3.5.1	Sustainable Schools Pilot Program	3-23
3.5.2	Pool Pump Pilot Program	3-23
3.5.3	Retail Electric Provider Pilot MTP Program (Nonresidential)	3-24
3.5.4	Retail Electric Provider Pilot MTP Program (Residential)	3-26
3.5.5	Residential Ecofactor Pilot Load Management Program	3-28
3.5.6	Residential EarthNetworks Pilot Load Management Program	3-29
4.	Impact Evaluation Results—El Paso Electric Company.....	4-1
4.1	Key Findings	4-1
4.1.1	Evaluated savings	4-1
4.1.2	Cost-effectiveness results	4-2
4.2	Detailed Findings—Commercial	4-4
4.2.1	Commercial Standard Offer Program	4-4
4.2.2	Commercial Market Transformation Programs	4-6
4.3	Detailed Findings—Residential	4-10
4.3.1	Residential Market Transformation Programs	4-10
4.3.2	Hard-to-Reach Solutions Market Transformation Program	4-13
4.4	Detailed Findings—Load Management	4-16
4.4.1	Load Management Standard Offer Program	4-16
4.5	Detailed Findings—Pilots	4-16
4.5.1	PV/Solar Pilot Market Transformation Program (Nonresidential)	4-16
4.5.2	PV/Solar Pilot Market Transformation Program (Residential)	4-17
4.5.3	Commercial Rebate Pilot Market Transformation Program	4-18
5.	Impact Evaluation Results—Entergy Texas, Inc.	5-1
5.1	Key Findings	5-1
5.1.1	Evaluated savings	5-1
5.1.2	Cost-effectiveness results	5-2



5.2	Detailed Findings—Commercial	5-3
5.2.1	Commercial Market Transformation Programs	5-3
5.3	Detailed Findings—Residential	5-6
5.3.1	Residential Standard Offer Program	5-6
5.3.2	Hard-to-Reach Standard Offer Program	5-9
5.3.3	Entergy Solutions High Performance Homes Market Transformation Program	5-12
5.3.4	Entergy Solutions High Performance Homes Market Transformation Program—Home Performance with ENERGY STAR®	5-13
5.4	Detailed Findings—Load Management	5-14
5.4.1	Load Management Standard Offer Program	5-14
6.	Impact Evaluation Results—Oncor	6-1
6.1	Key Findings	6-1
6.1.1	Evaluated savings	6-1
6.1.2	Cost-effectiveness results	6-2
6.2	Detailed Findings—Commercial	6-3
6.2.1	Commercial standard offer	6-3
6.2.2	Commercial market transformation	6-8
6.3	Detailed Findings—Residential	6-9
6.3.1	Residential standard offer	6-9
6.3.2	Residential market transformation	6-23
6.4	Detailed Findings—Load Management	6-23
6.4.1	Commercial Load Management Standard Offer Program	6-23
7.	Impact Evaluation Results—Sharyland.....	7-1
7.1	Key Findings	7-1
7.1.1	Evaluated savings	7-1
7.1.2	Cost-effectiveness results	7-2
7.2	Detailed Findings—Commercial	7-3
7.2.1	Commercial market transformation	7-3
7.3	Detailed Findings—Residential	7-4
7.3.1	Residential standard offer	7-4
7.3.2	Targeted Low-Income Weatherization Program	7-9
7.4	Detailed Findings—Load Management	7-11
7.4.1	Load Management Standard Offer Program	7-11
8.	Impact Evaluation Results—Southwestern Electric Power Company	8-1
8.1	Key Findings	8-1
8.1.1	Evaluated savings	8-1
8.1.2	Cost-effectiveness results	8-2



8.2	Detailed Findings—Commercial	8-3
8.2.1	Commercial Standard Offer Program	8-3
8.2.2	Commercial Market Transformation Programs	8-5
8.2.3	Open Market Transformation Program	8-6
8.3	Detailed Findings—Residential	8-7
8.3.1	Residential Standard Offer Program	8-7
8.3.2	CoolSaver® A/C Tune-Up Market Transformation Program (Residential)	8-10
8.3.3	Hard-to-Reach Standard Offer Program	8-11
8.4	Detailed Findings—Load Management	8-14
8.4.1	Load Management Standard Offer Program	8-14
9.	Impact Evaluation Results—Texas New Mexico Power Company	9-1
9.1	Key Findings	9-1
9.1.1	Evaluated savings	9-1
9.1.2	Cost-effectiveness results	9-2
9.2	Detailed Findings—Commercial	9-3
9.2.1	Commercial Solutions Market Transformation Program	9-3
9.2.2	SCORE/CitySmart Market Transformation Program	9-5
9.2.3	Open for Small Business Market Transformation Program	9-5
9.3	Detailed Findings—Residential	9-6
9.3.1	Residential Standard Offer Program	9-6
9.3.2	Hard-to-Reach Standard Offer Program	9-9
9.3.3	High-Performance Homes MTP Program	9-12
9.3.4	Low Income Weatherization Program	9-13
9.4	Detailed Findings—Load Management	9-15
9.4.1	Load Management Program	9-15
10.	Impact Evaluation Results—Xcel Energy Southwestern Public Service Company.....	10-1
10.1	Key Findings	10-1
10.1.1	Evaluated savings	10-1
10.1.2	Cost-effectiveness results	10-2
10.2	Detailed Findings—Commercial	10-3
10.2.1	Commercial Standard Offer Program	10-3
10.2.2	Retro-commissioning Market Transformation Program	10-6
10.3	Detailed Findings—Residential	10-6
10.3.1	Residential Standard Offer Program	10-6
10.3.2	Hard-to-Reach Standard Offer Program	10-9
10.3.3	Low-Income Weatherization	10-12
10.4	Detailed Findings—Load Management	10-14
10.4.1	Load Management Standard Offer Program	10-14



List of Tables

Table 1-1. AEP TCC Program Year 2014 Claimed and Evaluated Demand Savings	1-1
Table 1-2. AEP TCC Program Year 2014 Claimed and Evaluated Energy Savings	1-2
Table 1-3. AEP TCC Cost-effectiveness Results	1-3
Table 2-1. AEP TNC Program Year 2014 Claimed and Evaluated Demand Savings	2-1
Table 2-2. AEP TNC Program Year 2014 Claimed and Evaluated Energy Savings	2-2
Table 2-3. AEP TNC Cost-effectiveness Results	2-3
Table 3-1. CenterPoint Program Year 2014 Claimed and Evaluated Demand Savings.....	3-2
Table 3-2. CenterPoint Program Year 2014 Claimed and Evaluated Energy Savings.....	3-2
Table 3-3. CenterPoint Cost-effectiveness Results	3-3
Table 4-1. El Paso Electric Program Year 2014 Claimed and Evaluated Demand Savings..	4-1
Table 4-2. El Paso Electric Program Year 2014 Claimed and Evaluated Energy Savings....	4-2
Table 4-3. El Paso Electric Cost-effectiveness Results	4-3
Table 5-1. Entergy Program Year 2014 Claimed and Evaluated Demand Savings	5-1
Table 5-2. Entergy Program Year 2014 Claimed and Evaluated Energy Savings	5-2
Table 5-3. Entergy Cost-effectiveness Results.....	5-3
Table 6-1. Oncor Program Year 2014 Claimed and Evaluated Demand Savings.....	6-1
Table 6-2. Oncor Program Year 2014 Claimed and Evaluated Energy Savings	6-2
Table 6-3. Oncor Cost-effectiveness Results	6-3
Table 6-4. Reasons for Discrepancy for Lighting Projects with Different Fixture Counts	6-4
Table 7-1. Sharyland Program Year 2014 Claimed and Evaluated Demand Savings.....	7-1
Table 7-2. Sharyland Program Year 2014 Claimed and Evaluated Energy Savings.....	7-2
Table 7-3. Sharyland Cost-effectiveness Results.....	7-3
Table 8-1. SWEPCO Program Year 2014 Claimed and Evaluated Demand Savings.....	8-1
Table 8-2. SWEPCO Program Year 2014 Claimed and Evaluated Energy Savings	8-2



Table 8-3. SWEPCO Cost-effectiveness Results 8-3

Table 9-1. TNMP Program Year 2014 Claimed and Evaluated Demand Savings 9-1

Table 9-2. TNMP Program Year 2014 Claimed and Evaluated Energy Savings..... 9-2

Table 9-3. TNMP Cost-effectiveness Results..... 9-3

Table 10-1. Xcel SPS Program Year 2014 Claimed and Evaluated Demand Savings..... 10-1

Table 10-2. Xcel SPS Program Year 2014 Claimed and Evaluated Energy Savings..... 10-2

Table 10-3. Xcel SPS Cost-effectiveness Results..... 10-3

List of Figures

Figure 6-1. Oncor RSOP Comparison of Initial, Adjusted, and Evaluated Savings 6-11

Figure 6-2. Oncor HTR SOP Comparison of Initial, Adjusted, and Evaluated Savings 6-15

Figure 6-3. Oncor Targeted Weatherization Low Income Program Comparison of Initial, Adjusted, and Evaluated Savings..... 6-21



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 2014. 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, Lesli Cummings, Jarrett Simon 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: Lana Deville, Paul Pratt, and Jeff Thigpen
- TNMP: Stefani Case and Ashley Erdman
- 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: CLEARresult, 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
	Steve Cofer and Paul Youchak	Residential standard offer programs
The Cadmus Group	Scott Reeves and Natalie Bodington	Low-income/hard-to-reach programs
	Bob Ramirez, Ben Cheah, and Phani Pagadala	Commercial standard offer programs
Itron	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@tetrattech.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
CMTF	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
RMTF	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.

1.1 KEY FINDINGS

1.1.1 Evaluated savings

AEP TCC’s evaluated savings for PY2014 were 40,065 for demand (kW) and 63,775,136 for energy (kWh) savings. The overall kW and kWh portfolio realization rates were both slightly above 100 percent. While commercial evaluated savings were lower than claimed savings, residential evaluated savings offset this decrease.

The majority of commercial adjustments were minor changes, such as updates to building types, measure counts, or modifications to savings calculations, with the overall program realization rate close to 100 percent. While there was one large lighting savings project that had more substantial changes in the Score/CitySmart program, AEP responded to the EM&V team’s recommendation and changed the original claimed savings based on the evaluation findings. Residential evaluated savings were higher than the claimed largely due to adjustments in the RSOP air infiltration reduction and duct efficiency improvement measures.

Table 1-1 shows the claimed and evaluated demand savings for AEP TCC’s portfolio and broad customer sector/program categories for PY2014.

Table 1-1. AEP TCC Program Year 2014 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Precision at 90% Confidence
Total Portfolio		39,805	40,065	100.7%	2.1%
Commercial Sector	20.0%	7,972	7,881	98.9%	5.3%
Residential Sector	20.7%	8,221	8,572	104.3%	8.4%
Load Management	58.6%	23,323	23,323	100.0%	0.0%
Pilots	0.7%	289	289	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



1. Impact Evaluation Results—American Electric Power Texas Central Company...

Table 1-2 shows the claimed and evaluated energy savings for AEP TCC’s portfolio and broad customer sector/program categories for PY2014.

Table 1-2. AEP TCC Program Year 2014 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		63,587,033	63,775,136	100.3%	9.0%
Commercial Sector	53.9%	34,247,176	33,733,633	98.5%	16.0%
Residential Sector	44.3%	28,182,450	28,888,018	102.5%	6.5%
Load Management	0.1%	68,036	68,036	100.0%	0.0%
Pilots	1.7%	1,089,371	1,085,449	99.6%	0.5%

*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. Program-level results should only be used to provide insight into how individual programs are affecting the overall portfolio realization rates.**

In program-level realization rates, we have also included a qualitative rating of good, fair, and limited associated with the level of program documentation received from the utility, which was then used to determine an overall utility program documentation score. The overall program documentation score for AEP TCC was good for kW and fair for kWh. As program documentation recommendations for the PY2012 EM&V effort are to come into effect in PY2014, the EM&V team did not expect program documentation scores to improve between PY2012 and PY2014.

1.1.2 Cost-effectiveness results

AEP TCC’s overall portfolio had a cost-effectiveness of 2.20, or 2.39 excluding low-income programs.

The more cost-effective programs were SMART Source Solar PV MTP (Commercial), Residential SOP, and Commercial Solutions MTP. The less cost-effective programs were Irrigation Load Management MTP and SMART Source Solar PV MTP (Residential), neither of which passed cost-effectiveness testing.

The lifetime cost of PY2014 evaluated savings was \$0.012 per kWh and \$21.43 per kW.



1. Impact Evaluation Results—American Electric Power Texas Central Company...

Table 1-3. AEP TCC Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	2.19	2.20	1.87
Total Portfolio excluding low-income programs	2.37	2.39	2.01
Commercial Sector	2.57	2.53	2.16
Commercial Solutions MTP	3.25	3.24	2.75
Commercial SOP	3.24	3.22	2.59
CoolSaver A/C Tune-Up MTP (COM)	1.43	1.43	1.15
Open MTP	1.26	1.26	1.14
SCORE/CitySmart MTP	2.38	2.21	2.05
SMART Source Solar PV MTP (COM)	4.46	4.46	4.50
Residential Sector	2.28	2.35	1.92
A/C Distributor MTP	1.59	1.59	1.34
CoolSaver A/C Tune-Up MTP (RES)	1.18	1.18	1.06
High-Performance New Homes MTP	1.16	1.16	0.81
Residential SOP	3.07	3.31	2.58
SMART Source Solar PV MTP (RES)	0.89	0.89	0.85
Hard-to-Reach SOP	2.08	1.86	1.86
Low-Income	1.51	1.51	1.51
Targeted Low-Income Energy Efficiency Program	1.51	1.51	1.51
Load Management	1.72	1.72	1.72
Irrigation Load Management MTP	0.09	0.09	0.09
Load Management SOP	2.32	2.32	2.32

1.2 DETAILED FINDINGS—COMMERCIAL

1.2.1 Commercial Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
7.0%	2,803	2,800	99.9%	25.1%	15,988,200	15,924,247	99.6%	Limited



1. Impact Evaluation Results—American Electric Power Texas Central Company...

Completed Desk Reviews*	On-site M&V
14	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.

Evaluated realization rates for the AEP TCC CSOP were 100 percent for both energy and demand savings.

The EM&V team found minor issues with four desk review sites and four on-sites. These issues resulted in site-level energy realization rates between 91 percent and 102 percent. Only one site resulted in a realization rate reduction of more than 5 percent, as described below. The rest of the site discrepancies came from minor changes such as updates to building types, measure counts, or modifications to motor savings calculations.

Project ID #690895: The on-site visit found that a number of U-tube fixtures had not been retrofit, and the existing T12 fixtures were still in operation in parts of the facility. Additionally, the EM&V team found that the space type was listed as unconditioned, when in fact it was electrically conditioned, and there were extra occupancy sensors installed at the facility. Adjustments due to these on-site findings resulted in a 9 percent decrease in the evaluated energy savings, providing a realization rate of 91 percent for energy savings and 96 percent for demand savings. The desk review identified a discrepancy between the savings listed in the tracking data and the project documentation, which resulted in a realization rate of 93 percent for energy savings and 94 percent for demand savings.

As part of the PY2012 evaluation report, the EM&V team recommended that the utility provide all pertinent documentation to aid in the independent evaluation of the AEP TCC CSOP projects. There is still room for improvement in this recommendation, as only 2 out of the 14 sampled 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 building types, equipment quantities, and equipment specifications (wattages, efficiencies, ballast factors, etc.). Because sufficient documentation was provided for less than 70 percent of the projects in the sample, the EM&V team assigned a program documentation score of limited for the PY2014 CSOP projects.

1.2.2 Commercial market transformation

A. Commercial Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
2.1%	834	833	99.8%	7.0%	4,445,236	4,436,346	99.8%	Good



1. Impact Evaluation Results—American Electric Power Texas Central Company...

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

Evaluated savings for the Commercial Solutions MTP resulted in realization rates of 100 percent for kW and 100 percent for kWh. For this program the PY2014 evaluation efforts focused on desk reviews and on-site M&V. The realization rates were affected by savings adjustments made from desk review results for two projects, as further described below.

Project ID #729296: The EM&V team found the SEER rating for the project's DX AC unit reported in the ACE calculator tool was 16. This was different from that described within the technical specifications (SEER equal to 14) provided within the project documentation and assessed as part of the desk review. A second document, the Certificate of Product Ratings, identified the SEER equal to 16; however, the rating was for a slightly different model number than the one identified within the ACE. Therefore, the evaluation calculated the project savings based on the SEER rating provided within the specification sheet that matches the unit's make and model number. These findings decreased energy and demand savings (kWh and kW realization rates equal to 50 percent). This site did not receive an on-site M&V visit.

Project ID #729574: The EM&V team found that lighting fixture quantities and types varied slightly in some areas during the on-site M&V survey. Overall, six less fixtures and 14 incorrect fixture types were identified during the onsite survey, resulting in slightly understated project savings. The project updates resulted in increased savings (kWh realization rate equal to 109 percent and kW realization rate equal to 108 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for six of the six 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 for these estimates is good.

B. CoolSaver A/C Tune-Up Market Transformation Program (Nonresidential)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Project Documentation Score
3.5%	1,389	1,389	100.0%	6.9%	4,364,242	4,364,242	100.0%	Good



1. Impact Evaluation Results—American Electric Power Texas Central Company...

Completed Desk Reviews*	On-site M&V
5	9

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

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 Nonresidential CoolSaver A/C Tune-up MTP were the same as the claimed savings; thus, realization rates were 100 percent for both demand and energy.

For the tune-up measures, and as a follow-up to Recommendation #2a from the PY2013 Statewide Report, the EM&V team completed a comprehensive review of the tune-up measures. Our activities focused on comparing the stipulated/modeled M&V approach to the full M&V approach for this particular measure at the statewide level.¹

To support this impact evaluation activity for PY2014, the EM&V team completed a tracking system review. The main issues initially found with the tracking system were that test out values were incorrectly labelled as test in values. The EM&V team discussed this issue with the implementer early on, and the variable labelling was fixed in subsequent datasets.

Next, the EM&V team completed desk reviews for a select sample of projects. Because of our understanding of how tune-ups were being conducted in the field, we drew a random sample of tune-up measures instead of a stratified sample by tune-up methodology type (stipulated/modeled M&V approach versus the full M&V approach). What the EM&V learned throughout the course of completing the desk reviews and working with the implementer is that the full EM&V approach was actually more reflective of the stipulated approach. Given this, the EM&V team would have drawn more sample from the full M&V approach and less from the stipulated approach.

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 customer application and invoice, any calculators used, and reports of QA/QC or M&V activity, if conducted. What the EM&V team received for most projects was the Incentive Check Request and the Tune-up Data Collection Sheet (contractor field reports). The implementer also provided program documentation, including the CoolSaver 2014 Program Manual.

Additionally, the desk review process included replicating the tune-up methodologies provided by the implementer, to the extent possible. Because a key component of the tune-up methodology is the efficiency loss, the EM&V team investigated to determine actual efficiency loss/improvements in comparison to the stipulated values. While the EM&V team was not able to fully replicate the process by which the implementer determined the efficiency loss (e.g., conduct a complete regression analysis, whereby removing project outliers), our cursory

¹ Recommendation #2a stated: “From PY2012 to PY2013, the mix of deemed and custom measures funded through the commercial sector programs remained fairly consistent. However, the EM&V team recommends considering establishing deemed values for air conditioning tune-ups for both sectors that were part of both program years. Most TRMs do include air conditioning tune-up as a deemed measure.”



1. Impact Evaluation Results—American Electric Power Texas Central Company...

review of the efficiency loss numbers recorded by the implementer generally align with the EM&V team’s assessment. As a result, there was no effect on savings for the tune-up measures. The EM&V team also found that overall in Texas a significant increase (156 percent) in the number of tune-ups completed has occurred over the last three years.

The project documentation and raw data files included enough information that critical inputs to calculating savings could be determined and compared to the CoolSaver 2014 M&V Plan. The challenges the EM&V team encountered were that the full M&V tune-up methodology was essentially the same as the stipulated methodology. We learned that the additional data points being collected in the field in PY2014 as part of the full M&V process by the implementer were not directly being used to calibrate the model and hence not directly affecting current PY2014 projects. Additionally, the field reports did not indicate that the condenser coil was cleaned or that the airflow was adjusted to proper CFM/ton per the CoolSaver A/C Tune-up Program Manual. The manual does not include the methodology to adjust measured capacity and EERs to ARI conditions, which is a key step needed to verify those values. Additionally, all six steps required to complete the tune-ups may have been performed, but supporting documents do not clearly indicate all tasks were completed.

Currently, the PUCT has not approved a deemed savings value or deemed calculation method for tune-up measures. Until such an approval is given, regular calibrations of the model being used to develop these critical savings factors should be completed annually at a minimum.

Results of the tune-up evaluations continue to support Recommendation #2a from PY2013, in that the tune-up measure should be a deemed value or deemed calculation measure and that a full M&V process is not needed. This recommendation is supported by the fact that other similar programs in the same region (in particular, Arkansas), have deemed savings for tune-up measures that are based on refrigerant charge adjustments.

Because the EM&V team received sufficient documentation for all sampled sites, we were able to verify key inputs and assumptions. As a result, the program documentation score for these estimates is good.

C. SCORE/CitySmart Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
4.2%	1,667	1,580	94.8%	8.3%	5,296,896	4,856,196	91.7%	Good



1. Impact Evaluation Results—American Electric Power Texas Central Company...

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.

Evaluated savings for the SCORE/CitySmart MTP resulted in realization rates of 95 percent for kW and 92 percent for kWh. For this program the PY2014 evaluation efforts focused on desk reviews and on-site M&V. The realization rates were affected by savings adjustments made from desk review results for one project, as further described below.

Project ID #729716: As part of both the desk review and on-site M&V, the EM&V team found the project claimed savings for a significant reduction in fixture quantities that was attributed to the project. However, these fixtures are outdoor traffic signals and not interior, where a reduction is typically based on improved lighting levels and hence a direct influence of the project. Instead, these were due to renovations in the streets and intersections. There was no documentation to verify that the program had an influence in such redesigns.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, calculation methodology, and specifications) 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 site, specifically, information about the new lighting fixtures regarding non-qualifying LEDs and the savings methodology and assumptions to support key calculation input variable selections. Since sufficient documentation was provided for all of the sampled sites, the program documentation for these estimates is good.

D. Open Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
1.7%	668	668	100.0%	4.7%	2,975,834	2,975,834	100.0%	Good

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

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

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.



1. Impact Evaluation Results—American Electric Power Texas Central Company...

Evaluated savings for the Open MTP resulted in realization rates of 100 percent for both kW and kWh. For this program the PY2014 evaluation efforts focused on desk reviews and on-site M&V. The realization rates were insignificantly affected by savings adjustments made from on-site M&V results for one project, as further described below.

Project ID #730416: The EM&V team found one lighting fixture type varied slightly from reported, as identified during the on-site M&V survey. The project updates resulted in slightly increased savings (kWh realization rate equal to 100.3 percent and kW realization rate equal to 100.1 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, calculation methodology, specifications) 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 for these estimates is good.

E. SMART Source Solar PV Market Transformation Program (Nonresidential)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
1.5%	610	610	100.0%	1.9%	1,176,768	1,176,768	100.0%	Good

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.

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 PV/Solar Pilot MTP (Nonresidential) were 610 kW demand and 1,176,768 kWh annual energy, with realization rates of 100 percent.

Evaluated savings matched claimed or reported savings from program administrators exactly because the evaluation activities found no evidence of differences between installed and tracked system capacity. This finding was based on our desk reviews of three installations. Evaluated savings estimates are based solely on installed capacity (DC) reported in the tracking system multiplied by the approved deemed savings calculations of 1,600 kWh and 0.83 kW per kW of capacity.

The EM&V team was able to verify 100 percent of the installed system capacity ratings in the tracking system based on our review of a sample of either inspection reports or final invoices to confirm reported system capacity. Installed capacity is the only input to the evaluated



1. Impact Evaluation Results—American Electric Power Texas Central Company...

savings calculations for this program year, so the program documentation score for inputs to this savings estimate is considered good.

1.3 DETAILED FINDINGS—RESIDENTIAL

1.3.1 Residential standard offer

A. Residential Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
12.1%	4,829	5,224	108.2%	27.7%	17,595,431	18,906,291	107.5%	Good

Completed Desk Reviews*	On-site M&V
27	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.

Evaluated savings for the AEP TCC RSOP were 5,224 kW and 18,906,291 kWh, with realization rates of 108 percent and 107 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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



1. Impact Evaluation Results—American Electric Power Texas Central Company...

i. Data review

The data review realization rates are 101 percent for energy savings and 102 percent for demand 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 very close to 100 percent, indicating that the program tracking data is very consistent with the values in the TRM. The difference reflected in the data review realization rate is driven by several factors.

Air infiltration eligibility requirements. TRM V1.0 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.² For homes where the initial leakage exceeds 4.0 CFM₅₀ 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, five projects reported 0 savings where the initial leakage cap was applied, while the team calculated savings for these sites relative to the cap. Furthermore, six projects reported 0 savings because final leakage was below the specified minimal final ventilation level, while the team calculated the leakage reduction between the initial infiltration and the minimum final ventilation. Lastly, three projects reported positive ex-ante savings where infiltration levels remained within 10 percent of the initial cap post-retrofit, and the team did not assign ex-post savings for these project. The overall effect from these discrepancies in air infiltration savings was a small 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 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, and duct sealing 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 0.004 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 and demand savings for air infiltration, ceiling insulation, and duct sealing measures that may

² 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.



1. Impact Evaluation Results—American Electric Power Texas Central Company...

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 small decrease in the realization rate.

ii. Desk review

Desk reviews were completed for 27 projects and resulted in desk review realization rates of 100 percent and 99 percent for energy and demand 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 three of the projects. The team noted the following transcription errors:

- The pre-treatment R-value for ceiling insulation recorded in the tracking database was lower than the value recorded in project documentation, resulting in a decrease in the realization rate.
- The team also noted a small transcription error for one project in the square footage for wall insulation. This project documentation noted a decrease in installed square footage, which resulted in a minor decrease in the realization rate.
- Lastly, for one home that installed air infiltration reduction, the post-retrofit air leakage recorded in the tracking database was slightly lower than the value recorded in project documentation, resulting in a decrease in the realization rate.

iii. Site visits

Site visits were conducted for 15 projects, resulting in site visit realization rates of 106 percent and 107 percent for energy and demand savings, respectively, rounded to the nearest percentage point. Fourteen of the 15 visited sites received desk reviews.

Through the site review process, the EM&V team identified differences only in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is expected to be within ± 20 percent using a Duct Blaster test; for infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Discrepancies beyond ± 20 percent were noted for 5 of the 11 duct improvement projects. For two other projects, the team could not verify leakage onsite due to limited time or due to customer request. In one instance, the M&V team could not pressurize the house, as a closet opened directly to the attic. For this home, the team used the duct subtraction method, arriving at a leakage within 3 percent of the value reported in the data tracking system.



1. Impact Evaluation Results—American Electric Power Texas Central Company...

In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 67 CFM₂₅; however, the M&V team observed leakages both higher and lower than those values reported. At the home where the largest difference was observed, the customer did not recall the original contractor using a whole-house fan, indicating that the duct subtraction method was likely used to determine the leakage in the tracking system. Overall, the adjustments made based on on-site observations for this measure resulted in a net increase in the site visit realization rate.

Air infiltration improvements. Discrepancies beyond ± 10 percent were noted for seven of the nine homes that received a site visit after air sealing was performed. For one additional project, the M&V team could not verify the air leakage due to issues related to CFM testing procedures (e.g., calibration/pressurization). In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 1,208 CFM₅₀; however, the M&V team observed leakages both higher and lower than those values reported. At one site where the team observed the largest increase in leakage relative to the tracking system data, recent home remodeling may have affected the persistence of these energy-saving improvements, reducing savings for this project. The adjustments made based on on-site observations for this measure resulted in a net increase in the site visit realization rate.

iv. Documentation

Documentation was requested for a total of 28 sites through the supplemental data request. Of these sites, documentation was provided for 28, 27 of which 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.

B. Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh*)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
3.3%	1,328	1,283	96.6%	6.7%	4,256,719	3,650,136	85.8%	Good

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

Evaluated savings for the AEP TCC Hard-to-Reach SOP were 1,283 kW and 3,650,136 kWh, with realization rates of 97 percent and 86 percent for demand and energy, respectively.

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



1. Impact Evaluation Results—American Electric Power Texas Central Company...

- 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

i. Data review

The data review realization rates are 104 percent for energy savings and 107 percent for demand 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 slightly higher than 100 percent, indicating that the program tracking data is fairly consistent with the values in the TRM. The difference reflected in the data review realization rate is driven by several factors.

Air infiltration eligibility requirements. TRM V1.0 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.³ For homes where the initial leakage exceeds 4.0 CFM₅₀ 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 positive ex-ante savings where infiltration levels remained within 10 percent of the initial cap post-retrofit. The team did not assign ex-post savings for this project.

Low-flow showerhead savings attribution. Data review realization rates were influenced by differing treatment of low-flow showerhead measures. Where multiple showerheads were installed in a home, the EM&V team awarded savings on a per-showerhead basis. However,

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.



1. Impact Evaluation Results—American Electric Power Texas Central Company...

in the ex-ante calculation savings appear to have been awarded per household. These changes resulted in a small increase in the realization rate.

CFL savings calculations. The team observed 97 instances of reported ex-ante savings of 0 for CFLs, while the team calculated savings for these measures. Furthermore, 26 measures seem to use an algorithm (rather than deemed savings tables) and assumed a lower installed wattage than indicated in the tracking data.

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, ceiling insulation, duct insulation, and showerhead measures. 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 0.004 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 and demand savings for 56 CFL measures and one infiltration reduction 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. The overall effect was an increase in the realization rate.

ii. Desk review

Desk reviews were completed for 15 projects, and resulted in desk review realization rates of 100 percent for both energy and demand savings. No discrepancies were identified by the EM&V team through this review.

iii. Site visits

Site visits were conducted for five projects, resulting in site visit realization rates of 82 percent and 90 percent for energy and demand savings, respectively. All of the visited sites received desk reviews.

Through the site review process, the EM&V team identified differences in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is expected to be within \pm 20 percent using a Duct Blaster test; for infiltration measures, variation within \pm 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data collected during site visits to the estimation of savings after



1. Impact Evaluation Results—American Electric Power Texas Central Company...

confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Discrepancies beyond ± 20 percent were noted for one of the two duct improvement projects. In this case, the M&V team observed a difference in post-treatment leakage of 181 CFM₂₅. The team also noted that duct supply diffusers and return registers were uncommonly dirty, and tape may not have been able to stick to these surfaces properly. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

Air infiltration improvements. Discrepancies beyond ± 10 percent were noted for one of the two homes that received a site visit after air sealing was performed. In this case, the M&V team observed a difference in post-treatment leakage of 325 CFM₅₀. The M&V team noted that leaks and gaps in the attic access door and in ceiling joints around the apartment's perimeter likely resulted in the difference between the on-site measured leakage and data tracking system value. The adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

CFL installation. Discrepancies were also noted for one site where CFLs were reported to have been installed. The customer informed M&V field staff that CFLs had not been provided to them through the program. An inspection of the house did not identify any CFLs. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

iv. Documentation

Documentation was requested for a total of 15 sites through the supplemental data request. Of these sites, documentation was provided for 15, all of which 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.

1.3.2 Residential market transformation

A. CoolSaver A/C Tune-Up Market Transformation Program (Residential)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
2.1%	825	825	100.0%	4.9%	3,144,001	3,144,001	100.0%	Good



1. Impact Evaluation Results—American Electric Power Texas Central Company...

Completed Desk Reviews*	On-site M&V
5	17

*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 Residential CoolSaver A/C Tune-up MTP were the same as the claimed savings; thus, realization rates were 100 percent for both demand and energy.

For the tune-up measures, and as a follow up to Recommendation #2a from the PY2013 Statewide Report, the EM&V team completed a comprehensive review of the tune-up measures. Our activities focused on comparing the stipulated/modeled M&V approach to the full M&V approach for this particular measure at the statewide level.⁴

To support this impact evaluation activity for PY2014, the EM&V team completed a tracking system review. The main issues initially found with the tracking system were that test out values were incorrectly labelled as test in values. The EM&V team discussed this issue with the implementer early on and the variable labelling was fixed in subsequent datasets.

Next, the EM&V team completed desk reviews for a select sample of projects. Because of our understanding of how tune-ups were being conducted in the field, we drew a random sample of tune-up measures instead of a stratified sample by tune-up methodology type (stipulated/modeled M&V approach versus the full M&V approach). What the EM&V learned throughout the course of completing the desk reviews and working with the implementer is that the full EM&V approach was actually more reflective of the stipulated approach. Given this, the EM&V team would have drawn more sample from the full M&V approach and less from the stipulated approach.

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 customer application and invoice, any calculators used, and reports of QA/QC or M&V activity, if conducted. What the EM&V team received for most projects was the Incentive Check Request and the Tune-up Data Collection Sheet (contractor field reports). The implementer also provided program documentation including the CoolSaver 2014 Program Manual.

Additionally, the desk review process included replicating the tune-up methodologies provided by the implementer, to the extent possible. Because a key component of the tune-up methodology is the efficiency loss, the EM&V team investigated to determine actual efficiency loss/improvements in comparison to the stipulated values. While the EM&V team was not able to fully replicate the process by which the implementer determined the efficiency loss (e.g., conduct a complete regression analysis, whereby removing project outliers), our cursory

⁴ Recommendation #2a stated: "From PY2012 to PY2013, the mix of deemed and custom measures funded through the commercial sector programs remained fairly consistent. However, the EM&V team recommends considering establishing deemed values for air conditioning tune-ups for both sectors that were part of both program years. Most TRMs do include air conditioning tune-up as a deemed measure."



1. *Impact Evaluation Results—American Electric Power Texas Central Company...*

review of the efficiency loss numbers recorded by the implementer generally aligns with the EM&V team’s assessment. As result, there was no effect on savings for the tune-up measures. The EM&V team also found that overall in Texas a significant increase (156 percent) in the number of tune-ups completed has occurred over the last three years.

The project documentation and raw data files included enough information that critical inputs to calculating savings could be determined and compared to the CoolSaver 2014 M&V Plan. The challenges the EM&V team encountered were that the full M&V tune-up methodology was essentially the same as the stipulated methodology. We learned that the additional data points being collected in the field in PY2014 as part of the full M&V process by the implementer were not directly being used to calibrate the model and hence not directly affecting current PY2014 projects. Additionally, the field reports did not indicate that the condenser coil was cleaned or that the airflow was adjusted to proper CFM/ton per the CoolSaver A/C Tune-up Program Manual. The manual does not include the methodology to adjust measured capacity and EERs to ARI conditions, which is a key step needed to verify those values. Additionally, all six steps required to complete the tune-ups may have been performed, but supporting documents do not clearly indicate all tasks were completed.

Currently, the PUCT has not approved a deemed savings value or deemed calculation method for tune-up measures. Until such an approval is given, regular calibrations of the model being used to develop these critical savings factors should be completed annually at a minimum.

Results of the tune-up evaluations continue to support Recommendation #2a from PY2013, in that the tune-up measure should be a deemed value or deemed calculation measure and that a full M&V process is not needed. This recommendation is supported by the fact that other similar programs in the same region (in particular, Arkansas), have deemed savings for tune-up measures that are based on refrigerant charge adjustments.

Because the EM&V team received sufficient documentation for all sampled sites, we were able to verify key inputs and assumptions. As a result, the program documentation score for these estimates is good.

B. High-Performance New Homes Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
1.1%	435	435	100.0%	2.8%	1,777,564	1,777,564	100.0%	Good

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.



1. Impact Evaluation Results—American Electric Power Texas Central Company...

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 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 PY2014, the EM&V team received a REM/Rate⁵ file and Fuel Summary Report for each sampled project. In the past, the EM&V team has also received a DOE-2⁶ SIM file for each sampled project but did not receive those this year. While we were able to create a REM/Rate baseline home 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 three desk reviews the EM&V team completed, we did see slight variation in realization rates when assessing only the REM/Rate files (83 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 will work with both AEP TCC and the implementer to finalize an M&V methodology to be included with Texas TRM 3.0, Volume 4.

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

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/>.



1. Impact Evaluation Results—American Electric Power Texas Central Company...

C. SMART Source Solar PV Market Transformation Program (Residential)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.3%	122	122	100.0%	0.4%	235,168	235,168	100.0%	Good

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 the PV/Solar Pilot MTP (Residential) were 122 kW demand and 235,168 kWh annual energy, with realization rates of 1.

Evaluated savings matched claimed or reported savings from program administrators exactly because the evaluation activities found no evidence of differences between installed and tracked system capacity. This finding was based on our desk reviews of three installations. Evaluated savings estimates are based solely on installed capacity (DC) reported in the tracking system multiplied by the approved deemed savings calculations of 1,600 kWh and 0.83 kW per kW of capacity.

The EM&V team was able to verify 100 percent of the installed system capacity ratings in the tracking system based on our review of a sample of either inspection reports or final invoices to confirm reported system capacity. Installed capacity is the only input to the evaluated savings calculations for this program year, so the overall program documentation score for inputs to this savings estimate is considered good.

1.3.3 Targeted Low-Income Energy Efficiency Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
1.7%	683	684	100.2%	1.8%	1,173,567	1,174,858	100.1%	Good

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



1. Impact Evaluation Results—American Electric Power Texas Central Company...

Evaluated savings for the AEP TCC Targeted Low-Income Energy Efficiency program were 684 kW and 1,174,858 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 three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

A. *Data review*

The data review realization rates are 100 percent, rounded to the nearest percent, for both energy and demand 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.

While the data review realization rate is effectively 100 percent, there were several minor systematic differences that are worth noting.

Legacy deemed savings values. The team determined that the data review realization rates were influenced by the application of deemed savings from petition 27903 for installations of ENERGY STAR® refrigerator measures. These deemed savings values have been superseded by petition 38025, which is the basis for refrigerator savings in TRM V1.0. Nevertheless, savings for this measure account for 3 percent of evaluated energy and 1 percent of demand savings for the AEP TCC Low-Income Weatherization program and therefore do not greatly influence this program's realization rate. The overall effect was a decrease in the realization rate for refrigerators.

Air infiltration eligibility requirements. While TRM V1.0 contains several eligibility requirements for the infiltration reduction measure, low-income programs are exempt from these requirements. The TRM applies a cap of 4.0 CFM₅₀ per square foot to the pre-treatment infiltration against which contractors can claim savings.



1. Impact Evaluation Results—American Electric Power Texas Central Company...

In this program, application of this requirement in the ex-ante savings calculation led to differences between the reported and evaluated savings values for four projects. This resulted in an increase in the realization rate.

Low-flow showerhead savings attribution. Data review realization rates were influenced by differing treatment of low-flow showerhead measures. Where multiple showerheads were installed in a home, the EM&V team awarded savings on a per-showerhead basis. However, in the ex-ante calculation savings appear to have been awarded per household for 11 measures.

Divergence of inputs from tracking database. Two duct sealing projects calculated ex-ante savings using heating types that do not align with those provided in the tracking database. Furthermore, 13 showerhead measures used flow rates that did not align with those provided in the tracking data. These changes resulted in a small impact on the realization rate.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding differences. 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 15 projects, and resulted in desk review realization rates of 100 percent for both energy and demand savings. No discrepancies were identified by the EM&V team through this review.

C. Site visits

Site visits were conducted for two projects, resulting in site visit realization rates of 100 percent for energy and demand savings. All visited sites received desk reviews. M&V field staff found no discrepancies with the data tracking system.

D. Documentation

Documentation was requested for a total of 15 sites through the supplemental data request. Of these sites, documentation was provided for 15, all of which 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.



1. Impact Evaluation Results—American Electric Power Texas Central Company...

1.4 DETAILED FINDINGS—LOAD MANAGEMENT

1.4.1 Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
57.8%	22,997	22,997	100.0%	0.1%	67,384	67,384	100.0%	Good

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 PY2014 evaluation activities found that the individual participant load impact calculations in the work papers supplied to the EM&V team were virtually the same as those validated by using the individual customer interval load data. There were 87 reported program participants participating in 2014, and this is the number of participants for which the evaluation team received work papers and interval load data. Events were called on four separate days (5/29, 8/15, 8/21, and 9/10) during 2014. The event durations were one hour, two hours, one hour, and two hours in duration, respectively.

Evaluated savings for the AEP TCC Load Management Standard Offer program were 22,997 kW and 67,384 kWh.

The realization rate for kW was 100 percent and the realization rate for kWh was also 100 percent.

1.4.2 Irrigation Load Management Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.8%	326	326	100.0%	0.0%	652	652	100.0%	Good

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.



1. Impact Evaluation Results—American Electric Power Texas Central Company...

The program findings presented here are for the 2014 Irrigation Load Management Program. One event was initiated in the summer of this year, which lasted for two hours. The EM&V team verified that there were 39 customer accounts participating in the program.

Evaluated savings for the AEP TCC Irrigation Load Management Program were 326 kW and 652 kWh.

The realization rate for kW was 100 percent and the realization rate for kWh was also 100 percent because the evaluated savings matched the reported savings.

1.5 DETAILED FINDINGS—PILOTS

1.5.1 A/C Distributor Pilot Market Transformation Program (Residential)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.7%	289	289	100.0%	1.7%	1,089,371	1,085,449	99.6%	Good

Completed Desk Reviews*	On-site M&V
2	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 A/C Distributor MTP were 288.92 kW and 1,050,589 kWh, reflecting realization rates of 100 percent and 96.4 percent, respectively.

First, the EM&V team completed a tracking system review. No issues were found during the tracking system review.

The EM&V team requested all project documentation associated with each sampled project, including the customer application and invoice, any calculators used, and reports of QA/QC or M&V activity if conducted. For each project, the EM&V team received the Incentive Claim Form, the customer invoice, and the AHRI Certificate. The EM&V team found that for the sampled projects, neither the AEP TCC documents nor copies of the invoices received stated what the incentive is for the work performed, though the tracking system did. The EM&V team recommends that the program ensure incentive information is captured with project-specific documentation.

The EM&V team reviewed AEP TCC’s project documentation and compared the claimed savings against those in the Texas TRM. Because the EM&V team received sufficient documentation for sampled sites, we were able to verify key inputs and assumptions (e.g., equipment SEER and tonnage). Because supporting documentation was received for all sampled projects, the program documentation score is good.



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

This section presents the evaluated savings and cost-effectiveness results for AEP TNC’s energy efficiency portfolio. The key findings are summarized first, followed by details for each program in the portfolio.

2.1 KEY FINDINGS

2.1.1 Evaluated savings

AEP TNC’s evaluated savings for PY2014 were slightly less than claimed savings at 8,106 for demand (kW) and 11,486,248 for energy (kWh) savings. The overall kW portfolio realization rate is 99.5 percent, largely due to the majority of kW savings from the commercial load management program, which had a 100 percent realization rate. The overall kWh portfolio realization rate is 96.8 percent due to both commercial and residential sector adjustments.

Commercial evaluated savings differed from claimed savings primarily due to changes in business types, making projects consistent with TRM V1.0 and discrepancies between claimed savings and supporting documentation in equipment size. The majority of changes were made for CSOP. Residential evaluated savings were primarily changed due to discrepancies between tracking system savings and project documentation (i.e., reported heating type, square footage, and R-values). The majority of changes were made for RSOP.

Table 2-1. AEP TNC Program Year 2014 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Precision at 90% Confidence
Total Portfolio		8,151	8,106	99.5%	2.9%
Commercial Sector	21.7%	1,770	1,758	99.7%	6.9%
Residential Sector	14.6%	1,186	1,117	94.2%	18.2%
Load Management	62.7%	5,108	5,122	100.3%	0.0%
Pilots	1.1%	86	109	126.0%	15.0%

*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 PY2014.



2. Impact Evaluation Results—American Electric Power Texas North Company...

Table 2-2. AEP TNC Program Year 2014 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		11,867,206	11,486,248	96.8%	7.2%
Commercial Sector	64.7%	7,673,647	7,512,149	97.9%	9.6%
Residential Sector	32.4%	3,850,310	3,578,644	92.9%	10.9%
Load Management	0.3%	35,597	35,501	99.7%	0.0%
Pilots	2.6%	307,653	359,954	117.0%	9.3%

*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. Program-level results should only be used to provide insight into how individual programs are affecting the overall portfolio realization rates.**

In program-level realization rates, we have also included a qualitative rating good, fair, and limited associated with the level of program documentation received from the utility, which was then used to determine an overall utility program documentation score. The overall program documentation score for AEP TNC was good for kW and fair for kWh. As program documentation recommendations for the PY2012 EM&V effort are to come into effect in PY2014, the EM&V team did not expect program documentation scores to improve between PY2012 and PY2014.

2.1.2 Cost-effectiveness results

AEP TNC’s overall portfolio had a cost-effectiveness of 2.06, or 2.24 excluding low-income programs.

The more cost-effective programs were Commercial SOP and Residential SOP. The less cost-effective programs were SMART SourceSM and Irrigation Load Management MTP, neither of which passed cost-effectiveness testing.

The lifetime cost of PY2014 evaluated savings was \$0.013 per kWh and \$23.67 per kW.



2. Impact Evaluation Results—American Electric Power Texas North Company...

Table 2-3. AEP TNC Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	2.12	2.06	1.78
Total Portfolio excluding low-income programs	2.30	2.24	1.93
Commercial Sector	2.34	2.30	1.98
Commercial Solutions MTP	2.51	2.43	2.06
Commercial SOP	4.88	4.79	3.87
Open MTP	1.20	1.20	1.08
SCORE/CitySmart MTP	2.11	2.11	1.96
SMART Source Solar PV MTP (COM)	0.91	0.89	0.90
Residential Sector	2.19	2.08	1.74
A/C Distributor Pilot MTP	0.92	1.11	0.93
Residential SOP	2.94	2.66	2.08
SMART Source Solar PV MTP (RES)	0.87	0.87	0.83
Hard-to-Reach SOP	2.19	2.16	2.16
Low-Income	1.81	1.83	1.83
Targeted Low-Income Energy Efficiency Program	1.81	1.83	1.83
Load Management	2.86	2.86	2.86
Irrigation Load Management MTP	0.48	0.48	0.48
Load Management SOP	5.57	5.59	5.59

2.2 DETAILED FINDINGS—COMMERCIAL

2.2.1 Commercial Standard Offer Program

A. Commercial Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
8.0%	656	643	98.1%	24.7%	2,928,945	2,871,245	98.0%	Limited



2. Impact Evaluation Results—American Electric Power Texas North Company...

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.

Evaluated energy and demand savings for the CSOP had a minor change from the claimed savings taken from the program tracking system. The PY2014 realization rates for the CSOP were 98 percent for both energy and demand savings. Based on the quality of documentation reviewed, the EM&V team assigned a documentation score of limited for the AEP TNC CSOP projects in PY2014.

The EM&V team found minor issues with two desk review sites and three on-sites. These issues resulted in site-level energy realization rates between 77 percent and 102 percent. Four sites resulted in realization rate adjustments of over ± 5 percent and are described in detail below.

i. Desk reviews

Project ID #690914: The EM&V team changed the building type to “Retail: Excluding Malls and Strip Centers.” The desk review resulted in a realization rate of 90 percent for energy savings and 97 percent for the demand savings.

Project ID #722630: Limited information was available for review by the EM&V team during the desk review process, so no adjustments were made. The desk review realization rate was 100 percent for both energy and demand savings.

Project ID #746679: The EM&V team determined there was an error in the calculator for this chiller measure. Review of the ACE calculator tool confirmed TRM Version 1.0 values were improperly used; the EM&V team recalculated the savings following TRM guidelines in a separate spreadsheet. Per the TRM, a baseline efficiency value of 0.748 kW/ton was used, as the age of the baseline chiller was unknown. Energy and demand coefficients of 2,104 and 0.82, respectively, were used consistent with TRM guidelines for centrifugal water-cooled chillers between 300 and 600 tons. The TRM stipulates that a remaining useful life (RUL) of 5.1 years should be used for chillers of undetermined age. Savings for the RUL period were calculated using base efficiency of 0.748 kW/ton, post efficiency of 0.577 kW/ton with 19.9 years of measure life following the RUL period. These savings were averaged to get an annual energy and demand savings estimate. These adjustments resulted in a realization rate of 77 percent for both energy and demand savings in the desk review analyses.

Project ID #746677: During the desk review, the EM&V team found a significant lack of data for this custom site. The project involved a major retrocommissioning of the HVAC systems at the facility. As this is not a measure with prescriptive savings listed in the TRM, the calculation method requires a custom approach to accurately quantify the project savings. The ex-ante savings calculations utilized an oversimplified approach based mostly on undocumented pre- and post- operating hours and included a high volume of unsourced assumptions. Due to lack of proper documentation, end-use



2. Impact Evaluation Results—American Electric Power Texas North Company...

metering data, or facility billing data, the EM&V team has no method of recalculating a more accurate assessment of savings for this site. The EM&V team considered zeroing out savings for this site; however, there was some documentation that provided a full overview of the project scope (although it was not completely clear which measures were implemented and which were not), showing a significant amount of retrocommissioning work performed. Given this, the savings were passed through, resulting in a 100 percent realization rate for both energy and demand savings.

ii. On-sites

Project ID #690914: During the on-site for this lighting upgrades project, the EM&V team found that the occupancy sensors were not installed in the break room and that the lights, which were claimed to be installed in outside spaces, were actually installed in storage areas. In addition, the EM&V team found that the building type was incorrectly categorized as “Food Sales.” The EM&V team adjusted for the occupancy sensors, updated the space type, and changed the building type to “Retail: Excluding Malls and Strip Centers.” For the on-site review, these adjustments resulted in a realization rate of 83 percent for energy savings and 117 percent for demand savings.

Project ID #722630: This project involved the retrofit of LED lighting, HVAC systems, and an ENERGY STAR® roof. The on-site verified the installation of all measures and collected the specification sheets for the cool roof. The solar emittance factor provided in the specification sheets did not match the value used in the savings calculator and was adjusted accordingly, which resulted in a realization rate of 98 percent of energy savings and 94 percent for demand savings.

Project ID #746679: During the on-sites the EM&V team determined there was an error in the calculator for this chiller measure. Review of the ACE calculator tool confirmed TRM Version 1.0 values were improperly used; the EM&V team recalculated the savings following TRM guidelines in a separate spreadsheet. These adjustments resulted in a realization rate of 77 percent for both energy and demand.

As part of the PY2012 evaluation report, the EM&V team recommended that the utility provide all pertinent documentation to aid in the independent evaluation the AEP TNC CSOP projects. There is still improvement needed for CSOP in this area, as only four out of the ten sampled 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 building types, equipment quantities, and equipment specifications (wattages, efficiencies, ballast factors, etc.). Because sufficient documentation was provided for fewer than 70 percent of the projects in the sample, the EM&V team assigned a program documentation score of limited for the PY2014 AEP TNC CSOP projects.



2. Impact Evaluation Results—American Electric Power Texas North Company...

2.2.2 Commercial Market Transformation Program

A. Commercial Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
5.3%	429	431	100.4%	18.1%	2,148,768	2,047,776	95.3%	Good

Completed Desk Reviews*	On-site M&V
3	1

*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.

Evaluated savings for the Commercial Solutions MTP resulted in realization rates of 100 percent for kW and 95 percent for kWh. For this program the PY2014 evaluation efforts focused on desk reviews and on-site M&V. The realization rates were driven by savings adjustments made from desk review results for one project, as further described below.

Project ID #748509: The reported building type for this project was manufacturing. However, based on the space descriptions and photographic documentation assessed as part of the desk review and walk of the facility during the on-site M&V visit, the building type was changed to a warehouse (non-refrigerated) building type. This resulted in a decrease in operating hours and slight increase in demand coefficient. These findings decreased energy savings and increased demand savings (kWh realization rate equal to 61 percent and kW realization rate equal to 105 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, calculation methodology, and specifications) for three of the three 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, specifically, the final M&V plan for one project. Since sufficient documentation was provided for 100 percent of the sampled sites, the program documentation for these estimates is good.



2. Impact Evaluation Results—American Electric Power Texas North Company...

B. Open Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Project Documentation Score
4.2%	341	341	100.0%	12.8%	1,517,443	1,517,443	100.0%	Good

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 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 Open MTP were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent. For this program the PY2014 evaluation efforts focused on desk reviews and on-site M&V. There were no adjustments to any of the projects' savings calculations reviewed.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, calculation methodology, specifications) for ten of the ten 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 for these estimates is good.

C. SCORE/CitySmart Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
3.9%	316	315	99.6%	8.6%	1,024,498	1,022,449	99.8%	Good

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

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

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.



2. Impact Evaluation Results—American Electric Power Texas North Company...

Evaluated savings for the SCORE/CitySmart MTP were equal to the claimed savings, with realization rates for kW and kWh equaling nearly 100 percent. For this program the PY2014 evaluation efforts focused on desk reviews and on-site M&V. The realization rates were insignificantly affected by savings adjustments made from desk review results for two projects, as further described below.

Project ID #730885: The EM&V team found an error in one of the HVAC measures (measure 4). A new chiller’s tonnage entered into the ACE calculator tool was slightly different from that listed within the technical specifications provided as part of the project documentation and assessed as part of the desk review. This finding had only a slight impact to the overall lighting and HVAC project increasing energy and demand savings slightly (kWh realization rate equal to 100.4 percent and kW realization rate equal to 101 percent). This site did not receive an on-site M&V visit.

Project ID #735156: The EM&V team found updates necessary for one of the HVAC measures (measure 5). This measure is composed of numerous AC units installed as part of this new construction project. Based on the photographic documentation, technical specifications, and pre- and post-inspection notes assessed as part of the desk review, the equipment inventory and capacities were corrected slightly. These updates had a minor impact to the overall lighting and HVAC project, decreasing energy and demand savings slightly (kWh and kW realization rate equal to 99 percent). 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 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 for these estimates is good.

D. SMART Source Solar PV Market Transformation Program (Nonresidential)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
3.9%	316	315	99.6%	8.6%	1,024,498	1,022,449	99.8%	Good

Completed Desk Reviews*	On-site M&V
2	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 PV/Solar Pilot MTP (Nonresidential) were 28 kW demand and 53,992 kWh annual energy, with realization rates of 100 percent.



2. Impact Evaluation Results—American Electric Power Texas North Company...

Evaluated savings matched claimed or reported savings from program administrators exactly because the evaluation activities found no evidence of differences between installed and tracked system capacity. This finding was based on our desk review of two installations. Evaluated savings estimates are based solely on installed capacity (DC) reported in the tracking system multiplied by the approved deemed savings calculations of 1,600 kWh and 0.83 kW per kW of capacity.

The EM&V team was able to verify 100 percent of the installed system capacity ratings in the tracking system based on our review of a sample of either inspection reports or final invoices to confirm reported system capacity. Installed capacity is the only input to the evaluated savings calculations for this program year, so the overall uncertainty ranking for inputs to this savings estimate is considered good.

2.3 DETAILED FINDINGS—RESIDENTIAL

2.3.1 Residential Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
9.7%	791	721	91.1%	22.6%	2,684,792	2,423,293	90.3%	Good

Completed Desk Reviews*	On-site M&V
21	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.

Evaluated savings for the AEP TNC RSOP were 721 kW and 2,423,293 kWh, with realization rates of 91 percent and 90 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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



2. Impact Evaluation Results—American Electric Power Texas North Company...

incorporate utility-provided QC adjustments to initial savings calculations based on their own review process. The evaluation team's desk-review- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

A. *Data review*

The data review realization rates are 101 percent for both energy and demand 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 very close to 100 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.

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 increase in the realization rates for air infiltration, ceiling insulation, and duct sealing 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 0.003 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 21 projects, and resulted in desk review realization rates of 95 percent and 96 percent for energy and demand 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:

- For four homes that added ceiling insulation, the reported heating type, square footage, or pre-treatment R-value recorded in the tracking database did not reflect those found in project documentation. Overall, these changes led to a decrease in the realization rate.
- The team noted a transcription error in the heating type for one duct sealing project, which led to a decrease in the energy realization rate.
- Lastly, the team noted an increase in the recorded SEER rating for a heat pump measure, leading to an increase in the realization rate.



2. Impact Evaluation Results—American Electric Power Texas North Company...

C. Site visits

Site visits were conducted for 12 projects, resulting in site visit realization rates of 94 percent for energy and demand savings. All of the visited sites received desk reviews.

Through the site review process, the EM&V team identified differences only in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is expected to be within ± 20 percent using a Duct Blaster test; for infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Discrepancies beyond ± 20 percent were noted for four of the six duct improvement projects. At a fifth home, the duct leakage could not be verified as two supplies could not be accessed by M&V staff. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 117 CFM₂₅; however, the M&V team observed leakages both higher and lower than values reported. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

Air infiltration improvements. Discrepancies beyond ± 10 percent were noted for all of the six homes that received a site visit after air sealing was performed. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 985 CFM₅₀; however, the M&V team observed leakages both higher and lower than those values reported. The adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

D. Documentation

Documentation was requested for a total of 21 sites through the supplemental data request. Of these sites, documentation was provided for 21, all of which 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.



2. Impact Evaluation Results—American Electric Power Texas North Company...

2.3.2 Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
2.8%	224	223	99.4%	6.6%	788,742	775,965	98.4%	Good

Completed Desk Reviews*	On-site M&V
9	3

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

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 AEP TNC Hard-to-Reach SOP were 223 kW and 775,965 kWh, with realization rates of 99 percent and 98 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

A. Data review

The data review realization rates are 102 percent for both energy savings and demand 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.



2. Impact Evaluation Results—American Electric Power Texas North Company...

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.

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 ceiling insulation and duct sealing measures. 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 0.003 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 and demand savings for 12 CFLs 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 eight projects, and resulted in desk review realization rates of 99 percent and 98 percent for energy and demand savings, respectively, rounded to the nearest percentage point. The EM&V team identified a minor discrepancy between the tracking system data and the supporting documentation, leading to differences in calculated savings for one of the projects. For this ceiling insulation project, the team noted that the pre-treatment R-value recorded in the tracking database was lower than the value found in project documentation, which resulted in a decrease in the realization rate.

C. Site visits

Site visits were conducted for three projects, resulting in site visit realization rates of 98 percent and 99 percent for energy and demand savings, respectively. All visited sites received desk reviews

For one project, M&V field staff found one CFL bulb installed at the site, though three bulbs were recorded in the data tracking system. The customer stated that they had removed two CFLs installed in the bathroom due to insufficient light. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit energy and demand realization rates.

D. Documentation

Documentation was requested for a total of nine sites through the supplemental data request. Of these sites, documentation was provided for nine, all of which had sufficient



2. Impact Evaluation Results—American Electric Power Texas North Company...

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.

2.3.3 Residential market transformation

A. SMART Source Solar PV Market Transformation Program (Residential)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.8%	61	61	98.6%	1.0%	118,296	116,695	98.6	Good

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 the PV/Solar Pilot MTP (Residential) were 61 kW demand and 118,296 kWh annual energy, with realization rates of 98.6.

Evaluated savings matched claimed or reported savings from program administrators exactly because the evaluation activities found no evidence of differences between installed and tracked system capacity. This finding was based on our desk review of three installations. Evaluated savings estimates are based solely on installed capacity (DC) reported in the tracking system multiplied by the approved deemed savings calculations of 1,600 kWh and 0.83 kW per kW of capacity.

The EM&V Team was able to verify 100 percent of the installed system capacity ratings in the tracking system based on our review of a sample of either inspection reports or final invoices to confirm reported system capacity. Installed capacity is the only input to the evaluated savings calculations for this program year so the overall uncertainty ranking for inputs to this savings estimate is considered good.

Project ID #APV0223: Demand kW realization rate = 96 percent, Energy kWh realization rate = 96 percent. The claimed savings were based on a 10.6 kW system. The EM&V team determined that the installed system was only 10.12 kW based on the final signed invoice and confirmed this by counting 44 serial numbers of 230 W panels. This lowered the evaluated savings slightly.



2. Impact Evaluation Results—American Electric Power Texas North Company...

2.3.4 Targeted Low-Income Energy Efficiency Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
1.3%	110	112	102.5%	2.2%	258,480	261,090	101.0%	Good

Completed Desk Reviews*	On-site M&V
7	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.

Evaluated savings for the AEP TNC Targeted Low-Income Energy Efficiency program were 112 kW and 261,090 kWh, with realization rates of 103 percent and 101 percent for demand and energy savings, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

A. Data review

The data review realization rates are 101 percent for energy savings and 103 percent for demand 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.



2. Impact Evaluation Results—American Electric Power Texas North Company...

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

Legacy deemed savings values. The team determined that the data review realization rates were influenced by application of deemed savings from petition 27903 for installations of ENERGY STAR® refrigerator measures. These deemed savings values have been superseded by petition 38025, which is the basis for refrigerator savings in TRM V1.0. Nevertheless, savings for this measure account for 4 percent of evaluated energy and 1 percent of demand savings for the AEP TNC Low-Income Weatherization program and therefore do not greatly influence this program's realization rate. The overall effect was a decrease in the realization rate for refrigerators.

Air infiltration eligibility requirements. While TRM V1.0 contains several eligibility requirements for the infiltration reduction measure, low-income programs are exempt from these requirements. The TRM applies a cap of 4.0 CFM₅₀ per square foot to the pre-treatment infiltration against which contractors can claim savings.

In this program, application of this requirement in the ex-ante savings calculation led to differences between the reported and evaluated savings values for five projects. Furthermore, one project attributed savings to an infiltration measure where final leakage was below the specified minimum final ventilation level. Treating the minimum final ventilation as the post-treatment leakage, leakage was reduced by less than 10 percent, and therefore the team did not assign ex-post savings for this project. The overall effect from these discrepancies in air infiltration savings was a relatively large increase in the realization rate.

Divergence of inputs from tracking database. Two showerhead measures used flow rates that did not align with those provided in the tracking data. These changes resulted in a decrease in the realization rate.

Differences in rounding. The team identified minor differences between ex-ante and ex-post savings due to rounding differences. 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 and demand savings for three 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. The overall effect was a small increase in the realization rate.

B. Desk review

Desk reviews were completed for seven projects, and resulted in desk review realization rates of 100 percent for both energy and demand savings. No discrepancies were identified by the EM&V team through this review.

C. Site visits

Site visits were conducted for two projects, resulting in site visit realization rates of 100 percent and 99 percent for energy and demand savings, respectively. For one home that performed air sealing, the M&V team measured a small difference in post-treatment air



2. Impact Evaluation Results—American Electric Power Texas North Company...

infiltration of 65 CFM₅₀, 1 percent different than the database tracking system, which resulted in a small net decrease in the site visit realization rate.

D. Documentation

Documentation was requested for a total of seven sites through the supplemental data request. Of these sites, documentation was provided for seven, all of which 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.

2.4 DETAILED FINDINGS—LOAD MANAGEMENT

2.4.1 Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
57.1%	4,654	4,668	100.3%	0.3%	31,961	31,878	99.7%	Good

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 PY2014 evaluation activities found that the individual participant load impact calculations in the work papers supplied to the EM&V team were the same as those validated by using the individual customer interval load data. There were eight reported program participants in 2014, and this is the number of participants for which the evaluation team received work papers and interval load data. Events were called on five separate days (5/29, 5/30, 6/5, 7/14, and 8/7) during the 2014. The duration of the events was one hour, one hour, two hours, five hours, and two hours, respectively.

Evaluated savings for the AEP TNC Load Management Standard Offer program were 4,668 kW and 31,878 kWh. These minor discrepancies are most likely due to rounding and are of no significance.

The realization rate for kW was 0.997 and the realization rate for kWh was also 1.003.



2. Impact Evaluation Results—American Electric Power Texas North Company...

2.4.2 Irrigation Load Management Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
5.6%	454	454	100.0%	0.0%	3,636	3,636	100.0%	Good

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 program findings presented here are for the 2014 Irrigation Load Management Program. Three events were initiated in the summer of this year. The EM&V team verified that there were eight customer accounts participating in the program. Events were called on three days (6/5, 7/14, and 8/7) during the summer of 2014. The event durations were two hours, four hours, and two hours, respectively.

Evaluated savings for the AEP TNC Irrigation Load Management Program were 454 kW and 3,636 kWh.

The realization rate for kW was 1.00 and the realization rate for kWh was also 1.00 because the evaluated savings matched the reported savings.

2.5 DETAILED FINDINGS—PILOTS

2.5.1 A/C Distributor Pilot Market Transformation Program (Residential)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
1.1%	86	109	126.0%	2.6%	307,653	359,954	117.0%	Good

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 AEP TNC’s A/C Distributor Pilot MTP were 108.62 kW and 359,954 kWh, with realization rates of 126 percent and 117 percent, respectively.



2. Impact Evaluation Results—American Electric Power Texas North Company...

The EM&V team first completed a tracking system review. No issues were found through that assessment.

The EM&V team also completed desk reviews for a select sample of projects. In order to complete comprehensive desk reviews for this program, the EM&V team requested all project documentation associated with each sampled project, including the customer application and invoice, any calculators used, and reports of QA/QC or M&V activity if conducted. What the EM&V team received for each project was the Incentive Claim Form, the EESP's customer invoice, and the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Certificate. This project documentation included energy efficiency ratio (EER), seasonal energy efficiency ratio (SEER), and tonnage information, which are the critical inputs to calculating savings to allow for comparison to the Texas TRM. Because the EM&V team received sufficient documentation for all sampled sites, we were able to verify key inputs and assumptions.

Because sufficient supporting documentation for all sampled projects was received, the program documentation score is good.



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.

3.1 KEY FINDINGS

3.1.1 Evaluated savings

CenterPoint's evaluated savings for PY2014 were 159,193 for demand (kW) and 150,942,241 for energy (kWh) savings. The overall kW portfolio realization rate is 100.1 percent, primarily due to the large percentage of kW savings from the commercial load management program and the 100 percent realization rate for this program. While the commercial sector saw slight decreases in kW savings, the residential sector saw a slight increase, as the EM&V team applied winter peak savings estimates for LEDs in the residential Advanced Lighting Program, which are higher than the summer peak demand savings claimed by CenterPoint. The kWh portfolio realization rate is 98.5 percent, primarily due to adjustments in the LEDs' hours of operations in the residential Advanced Lighting Program to reflect TRM values.

Commercial evaluated savings were adjusted for a number of issues, including discrepancies in tracking system savings (tracking system claimed savings did not match project calculator savings), saving calculation changes to be consistent with TRM V1.0, and project-level findings such as changes in fixture counts and efficiencies and business types. Residential evaluated savings were adjusted to be consistent with TRM V1.0. Residential on-site M&V also resulted in minor changes, such as for square footage, heating equipment type (in a few cases electric resistance heat was erroneously recorded where the EM&V team found heat pumps), and counts of CFLs.

Table 3-1 shows the claimed and evaluated demand savings for CenterPoint's portfolio and broad customer sector/program categories for PY2014.



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

Table 3-1. CenterPoint Program Year 2014 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Precision at 90% Confidence
Total Portfolio		159,094	159,193	100.1%	1.2%
Commercial Sector	9.3%	14,819	14,572	98.3%	13.1%
Residential Sector	13.7%	21,846	22,192	101.6%	0.4%
Load Management	71.2%	113,303	113,303	100.0%	0.0%
Pilots	5.7%	9,126	9,126	100.0%	2.5%

*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 PY2014.

Table 3-2. CenterPoint Program Year 2014 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		153,170,389	150,942,241	98.5%	10.6%
Commercial Sector	52.9%	81,074,344	81,400,100	100.4%	19.6%
Residential Sector	37.0%	56,736,102	54,182,199	95.5%	0.4%
Load Management	0.2%	311,583	311,583	100.0%	0.0%
Pilots	9.8%	15,048,359	15,048,359	100.0%	3.6%

*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. Program-level results should only be used to provide insight into how individual programs are affecting the overall portfolio realization rates.**



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

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 limited kWh program documentation score for PY2014. As program documentation recommendations from the PY2012 EM&V effort are to come into effect in PY2014, the EM&V team did expect program documentation scores to improve between PY2012 and PY2014.

3.1.2 Cost-effectiveness results

CenterPoint’s overall portfolio had a cost-effectiveness of 2.12, or 2.44 excluding low-income programs.

The more cost-effective programs were ENERGY STAR® Homes MTP and Large Commercial SOP. The less cost-effective programs were EnergyWise Resource Action Program and several pilot programs. Pilot programs in their first year of operation are not required to pass cost-effectiveness. The Home Performance with ENERGY STAR® program did not pass cost-effectiveness, but the program was discontinued in 2014.

The lifetime cost of PY2014 evaluated savings was \$0.012 per kWh and \$21.89 per kW.

Table 3-3. CenterPoint Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	2.14	2.12	1.76
Total Portfolio excluding low-income programs	2.46	2.44	2.00
Commercial Sector	2.65	2.65	2.21
Large Commercial SOP	3.23	3.22	2.59
Texas SCORE MTP (Commercial MTP)	1.89	1.90	1.77
Retro-Commissioning MTP	0.00	0.00	0.00
Advanced Lighting Commercial	1.58	1.57	1.42
Residential Sector	2.86	2.80	2.13
ENERGY STAR® Homes MTP	4.24	4.24	2.97
Residential & Small Commercial SOP	1.85	1.79	1.40
Advanced Lighting Residential	3.72	3.10	2.79
A/C Distributor MTP (RES)	1.58	1.55	1.30



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Home Performance with ENERGY STAR® MTP	0.24	0.24	0.19
EnergyWise Resource Action MTP	0.86	0.86	0.68
Multi-family Space and Water Heating MTP (RES)	1.86	1.86	1.49
Hard-to-Reach SOP	1.47	1.50	1.50
Multi-family Space and Water Heating MTP (HTR)	1.39	1.39	1.39
Low-Income	1.32	1.31	1.31
Agencies in Action MTP	1.32	1.31	1.31
Load Management	1.78	1.78	1.78
Large Commercial Load Management SOP	1.78	1.78	1.78
Pilots	1.29	1.27	1.11
Sustainable Schools Pilot	1.15	1.15	1.07
Pool Pump Pilot	1.68	1.28	1.03
Retail Electric Provider MTP (COM)	2.51	2.51	2.01
Retail Electric Provider MTP (RES)	0.97	0.97	0.89

3.2 DETAILED FINDINGS—COMMERCIAL

3.2.1 Commercial standard offer

A. Commercial Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
6.8%	10,879	10,544	96.9%	42.0%	64,311,627	64,726,185	100.6%	Fair

Completed Desk Reviews*	On-site M&V
30	22

*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 realization rates for CenterPoint CSOP were 101 percent for energy and 97 percent for demand savings. The EM&V team gauged the ex-ante documentation and assigned a program documentation score of fair to the PY2014 CenterPoint CSOP projects.



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

The EM&V team adjusted the claimed savings based on findings for nine desk reviews and five on-site verifications. These adjusted kWh realization rates ranged from 64 percent to 123 percent. The claimed savings for the remainder of the reviewed sites were either unaltered or underwent minor adjustments.

Details for the specific projects that required significant savings adjustments (± 10 percent) are listed below by Project ID and by desk review and on-site findings:

i. Desk reviews

Project ID #736105: A discrepancy between the tracking data and ex-ante project calculations was also identified. The project savings calculator showed energy savings of 125,082 kWh and demand savings of 34.63 kW, while the tracking data showed energy savings of 112,866 kWh and demand savings of 30.90 kW. This was the only reason for discrepancy in the savings identified during the desk review and resulted in a realization rate of 111 percent for energy and 112 percent for demand.

Project ID #753487: The EM&V team determined that the ex-ante chiller savings calculations were not consistent with the TRM. This project involved the replacement of a 425 ton water-cooled centrifugal chiller with a 450 ton water-cooled screw chiller. To ensure consistency with the TRM, the ex-post savings were calculated in two parts. The first part calculated the savings for the early replacement (ER) period using an ER baseline centrifugal chiller and the as-installed unit's specifications. These savings were calculated for 5.6 years based on the age of the chiller and the TRM. Then the replacement-on-burnout (ROB) period impacts were calculated using a baseline efficiency screw chiller from the TRM and the as-installed chiller's specifications. These savings were calculated for the remaining useful life (RUL) of the screw chiller, which is the effective useful life (EUL) of a screw chiller minus the RUL of the centrifugal chiller for 14.4 years. These two savings values were summed and divided by the 20-year EUL of the screw chiller in order to find the average first year savings. As a result, the realization rates for this project were calculated to be 123 percent for both energy and demand.

Project ID #753586: Per the on-site verification and desk review findings, the EM&V team determined that the ex-ante chiller savings calculations were not consistent with the TRM. This project involved the replacement of four large water-cooled centrifugal chillers in a large office facility. The energy and demand savings were recalculated per the TRM guidelines. Baseline efficiency of 0.748 kW/ton was used for the RUL period found in the TRM. An ROB baseline efficiency of 0.577 kW/ton was used for the ROB period; these savings were averaged over the EUL of the installed chillers to calculate the average annual savings. The new calculation method resulted in realization rates of 64 percent for both energy and demand in both the on-site and desk review analyses.

Project ID #709904: The EM&V team found that the utility pre- and post-installation inspection forms showed different fixture quantities than what was reported in the utility calculator. These quantity adjustments to the calculations decreased the project savings estimates, resulting in a realization rate of 88 percent for energy and 91 percent for demand.

Project ID #753598: Per the desk review findings, the EM&V team found that ex-ante savings calculations did not match the tracking data savings for this lighting upgrades project. The EM&V team was able to match the fixture counts, model numbers from the



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

calculator to the post-inspection documentation and accepted the savings listed in the ex-ante calculator, which resulted in a realization rate of 115 percent for both energy and demand.

ii. On-sites

Project ID #736105: During the on-site M&V visit, the EM&V team found fewer fixture quantities than were reported in the ex-ante documentation for this lighting project. Adjustments due to this discrepancy resulted in a realization rate of 75 percent for energy and 73 percent for demand for the on-site verification.

Project ID #753586: The EM&V team’s on-site confirmed that the ex-ante chiller savings calculations were not consistent with the TRM. This project involved the replacement of four large water-cooled centrifugal chillers in a large office facility. The energy and demand savings were recalculated per the TRM guidelines. Baseline efficiency of 0.748 kW/ton was used for the RUL period found in the TRM. An ROB baseline efficiency of 0.577 kW/ton was used for the ROB period; these savings were averaged over the EUL of the installed chillers to calculate the average annual savings. The new calculation method resulted in realization rates of 64 percent for both energy and demand.

iii. Other considerations

It must be noted that the ex-ante savings for CenterPoint’s Commercial SOP changed at the end of the evaluation cycle. There was a significant amount of savings—approximately 14,000 MWh—that were approved after the EM&V team’s final tracking database extract. This addition did not affect the sampling or other evaluation activities, but if the EM&V team had the opportunity to review these changes early on, the evaluation sample could have been designed to capture an even wider range of measures and projects.

As part of the PY2012 evaluation report, the EM&V team recommended that the utility provide all pertinent documentation to aid in the independent evaluation of any project. Of the PY2014 projects reviewed, 24 out of 30 (80 percent) had sufficient documentation. For the remaining 20 percent of the projects, the EM&V team was not able to verify key inputs and assumptions that went into the savings calculations for these projects, including building types, equipment quantities and equipment specifications (wattages, efficiencies, ballast factors, etc.). Because sufficient documentation was provided for 80 percent of the projects in the sample, the EM&V team assigned a program documentation score of fair for the CenterPoint CSOP PY2014 projects.

3.2.2 Commercial market transformation

A. Retro-Commissioning Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
NA	NA	NA	NA	NA	NA	NA	NA	Good



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

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

Evaluated savings for the RCx MTP did not result in realization rates, as no savings were claimed in PY2014. All RCx projects that completed implementation in PY2014 had been claimed in PY2013. However, since these projects were not evaluated as part of PY2013, they were included in the PY2014 EM&V. Going forward, CenterPoint will claim RCx project savings in the year they are completed, which is a better practice, facilitating the proper evaluation of the project. The desk reviews verified all measure savings methodologies and assumptions are well documented. According to the final verification reports, all measures are installed and operating according to the key parameters and assumptions made in the savings estimates. The on-site survey completed found substantial persistence for these measures with no change from implementation. This is significant, as some measures at this site were originally installed and have been in operation since 2012. The customer has reported a reduction in energy consumption and lower utility bills. It is assumed that these are a result of RCx measures implemented throughout the facility. Equipment operation is satisfactory and occupant comfort has not been degraded. The site commented that “measures implemented are commendable and are operating as designed.”

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, calculation methodology, specifications) for all of the three sites that had desk reviews completed because sufficient documentation was provided for the sites. This program continues to provide excellent documentation for projects. Improvements in project file organization was noted. Since sufficient documentation was provided for 100 percent of the sampled sites, the uncertainty ranking for these estimates is good.

B. Texas SCORE Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
2.2%	3,552	3,645	102.6%	9.1%	13,941,103	13,895,097	99.7%	Good

Completed Desk Reviews*	On-site M&V
6	3

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



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

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 SCORE MTP resulted in realization rates of 103 percent for kW and 100 percent for kWh. For this program the PY2014 evaluation efforts focused on desk reviews and on-site M&V. The realization rates were driven by savings adjustments made from desk review and on-site survey results as further described below.

Project ID #735028: The reported building type for this project was education, summer. However, based on the space descriptions and photographic documentation assessed as part of the desk review and walk of the facility during the on-site M&V visit, the building type was changed to a warehouse (non-refrigerated) building type. This resulted in a slight drop in operating hours and increase in demand coefficient. These findings decreased energy savings and increased demand savings (kWh realization rate equal to 98 percent and kW realization rate equal to 112 percent).

Project ID #740651: The claimed savings within the deemed lighting survey form of the project documentation did not match the reported savings within the tracking database. Additional project documentation clearly identified that a change had been made to the building type selection from health care (in-patient) initially to a nursing and resident care facility; however, these savings adjustments were not updated within the tracking database. These findings decreased both energy and demand savings (kWh realization rate equal to 42 percent and kW realization rate equal to 60 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for ten of the ten 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 for these estimates is good.

C. Advanced Lighting Commercial Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.2%	388	385	99.4%	1.8%	2,821,615	2,807,507	99.5%	Good

Completed Desk Reviews*	On-site M&V
10	0

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

Evaluated savings for the Advanced Lighting Commercial MTP were equal to the claimed savings, with realization rates for kW and kWh equaling 100 percent. For this program the PY2014 evaluation efforts focused on desk reviews. The realization rates were insignificantly



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

affected by savings adjustments made from desk review results for one project, as further described below.

Project ID #746683: The EM&V team found an error in the new fixture wattage for this lighting new construction project. The new fixture wattage was incorrectly input as 73 watts into the calculator. However, based on the photographic documentation and equipment specifications assessed as part of the desk review, the fixture requires 79 watts. These findings decreased energy and demand savings (kWh realization rate equal to 98 percent and kW realization rate equal to 97 percent). 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 ten of the ten 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 for these estimates is good.

3.3 DETAILED FINDINGS—RESIDENTIAL

3.3.1 Residential Standard Offer Program

A. Residential Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.3%	432	417	96.6%	0.6%	920,727	891,724	96.9%	Good

Completed Desk Reviews*	On-site M&V
20	10

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

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 417 kW and 891,724 kWh, with realization rates of 97 percent for both demand and energy.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

i. Data review

The data review realization rates are 103 percent for energy savings and 102 percent for demand 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 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.

Potential 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. CenterPoint does not report unadjusted savings values for this program, and therefore the team cannot conclusively identify where the utility's QC adjustment may have produced an observed discrepancy between ex-ante and ex-post savings values.

Irreproducible differences between the team's calculated savings values and those observed in the utility's tracking data were noted for ceiling insulation, ENERGY STAR® window, and central AC measures. It is possible that these differences stem from QC adjustments. The overall effect was an increase in the realization rate.

Heat pump cooling savings. Heat pumps replacing electric resistance furnaces, which constitute the majority of heat pump installations performed through the program, report only heating-side ex-ante energy savings. The deemed savings in TRM V1.0 assume that, where heat pumps replace electric resistance furnaces, they also supplant an existing air conditioner, and therefore both heating and cooling savings are awarded. Ex-post savings include summer cooling savings for these measures, resulting in an increase in the energy realization rate.

Minor calculation differences. The team observed an additional minor divergence in energy and demand savings for one ENERGY STAR® window project, where the ex-ante savings were reported to be ten times the calculated ex-post savings. This does not appear to indicate a systematic error. The overall effect was a decrease in the realization rate.



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

ii. Desk review

Desk reviews were completed for 20 projects and resulted in desk review realization rates of 96 percent for both energy and demand savings. The EM&V team identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for two of the projects.

- For one project, the team noted a transcription error in the SEER rating for a central air conditioning measure. The SEER rating in the project documentation was higher than in the tracking system, leading to an increase in the realization rate.
- For a window project, one record appeared to be a duplication and was given 0 savings, leading to a decrease in the realization rate.

iii. Site visits

Site visits were conducted for ten projects, resulting in site visit realization rates of 99 percent for both energy and demand savings. Nine of the ten visited sites received desk reviews.

For one project, M&V field staff measured the square footage of installed ceiling insulation to be 11 percent lower than that recorded in the data tracking system for this customer. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

iv. Documentation

Documentation was requested for a total of 22 sites through the supplemental data request. Of these sites, documentation was provided for 22, 20 of which 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.

B. Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.5%	796	819	102.8%	1.0%	1,474,854	1,508,334	102.3%	Fair

Completed Desk Reviews*	On-site M&V
19	10

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

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.



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

Evaluated savings for the CenterPoint Hard-to-Reach SOP were 819 kW and 1,508,334 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 at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

Details on data review, desk review, and site visit 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 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 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.

Air infiltration eligibility requirements. TRM V1.0 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.⁷ For homes where the initial leakage exceeds 4.0 CFM₅₀ per square foot, this cap is to be treated as the starting leakage.

For the CenterPoint Hard-to-Reach Standard Offer Program, one project calculated savings relative to the initial leakage where a cap was applied, while the team calculated savings for this site relative to the cap. The overall effect was a decrease in the realization rate.

Potential 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

⁷ 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.



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

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. CenterPoint does not report unadjusted savings values for this program, and therefore the team cannot conclusively identify where the utility’s QC adjustment may have produced an observed discrepancy between ex-ante and ex-post savings values.

Irreproducible differences between the team’s calculated savings values and those observed in the utility’s tracking data were noted for ceiling insulation and lighting measures. It is possible that these differences stem from QC adjustments. The overall effect was an increase in the realization rate.

Minor calculation differences. The team observed additional divergences in savings for five lighting measures where ex-ante savings appear to have been calculated for a different installed CFL wattage than reported in the tracking system, and for years prior to 2014 when EISA standards had not been fully phased in. The overall effect was a decrease in the realization rate.

ii. Desk review

Desk reviews were completed for 19 projects, and resulted in desk review realization rates of 100 percent for both energy and demand savings, rounded to the nearest percentage point. The EM&V team identified a minor discrepancy between the tracking system data and the supporting documentation, leading to differences in calculated savings for one of the projects. For this ceiling insulation project, the team noted that the area recorded in the tracking database was lower than the value found in project documentation, leading to a minor decrease in the realization rate, which rounded to 100 percent.

iii. Site visits

Site visits were conducted for ten projects, resulting in site visit realization rates of 100 percent for energy and demand savings. Nine of the ten visited sites received desk reviews. M&V field staff found no discrepancies with the data tracking system.

iv. Documentation

Documentation was requested for a total of 22 sites through the supplemental data request. Of these sites, documentation was provided for 22, 19 of which 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 fair.

3.3.2 Residential market transformation

A. A/C Distributor Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
1.3%	2,127	2,076	97.6%	4.5%	6,930,143	6,791,540	98.0%	Good



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

Completed Desk Reviews*	On-site M&V
8	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 A/C Distributor MTP were 2,075.52 kW and 6,791,540 kWh, reflecting realization rates of 97.6 percent and 98.0 percent, respectively.

First, the EM&V team completed a tracking system review. No issues were found during the tracking system review.

The EM&V team requested all project documentation associated with each sampled project, including the customer application and invoice, any calculators used, and reports of QA/QC or M&V activity if conducted. For each project, the EM&V team received the Incentive Claim Form, the customer invoice, the AHRI Certificate, and the Customer Acknowledgement Form. The EM&V team found that for all sampled projects neither the CenterPoint documents nor copies of the invoices received stated what the incentive is for the work performed, though the tracking system did. The EM&V team recommends that the program ensure incentive information is captured with project-specific documentation.

The EM&V team reviewed CenterPoint's project documentation and compared the claimed savings against those in the Texas TRM. Because the EM&V team received sufficient documentation for all sampled sites, we were able to verify key inputs and assumptions (e.g., equipment SEER and tonnage).

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

B. ENERGY STAR® Homes Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
7.6%	12,139	12,139	100.0%	19.0%	29,094,362	29,094,362	100.0%	Good



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

Completed Desk Reviews*	On-site M&V
10	0

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

Evaluated savings for CenterPoint's ENERGY STAR® 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 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 PY2014, the EM&V team received a REM/Rate file and Fuel Summary Report for each sampled project. In the past, the EM&V team has also received a DOE-2 SIM file for each sampled project but did not receive those this year. While we were able to create a REM/Rate baseline home 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 provide insight into an interim step in the Beacon modeling process, making our analysis more robust.

Across the ten desk reviews the EM&V team completed, we did see slight variation in realization rates when assessing only the REM/Rate files (84 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 will work with both CenterPoint and the implementer to finalize an M&V methodology to be included with Texas TRM 3.0, Volume 4.

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

C. Multi-Family Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.9%	1,442	1,442	100.0%	1.9%	2,913,805	2,913,805	100.0%	Good



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

Completed Desk Reviews*	On-site M&V
12	8

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

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 Multi-Family MTP were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent. For this program the PY2014 evaluation efforts focused on desk reviews and on-site M&V. There were no adjustments to any of the projects savings calculations reviewed.

i. New homes measures

In PY2014, the Multi-Family MTP introduced new home measures into the program. As part of the evaluation for PY2014, the EM&V team completed desk reviews for three new home multifamily sites. 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, equipment specifications (e.g., cut sheets, AHRI certificates), and modeling and energy savings information.

The evaluation received program input documentation from the implementer as well as a REM/Rate⁸ file for each sampled project and QA/QC forms. As a result, we were able to create a REM/Rate baseline multifamily home file and compare the sampled REM/Rate files to that base multifamily home. While the EM&V team is comfortable with the REM/Rate modeling approach, not having received the DOE-2 SIM files for each sampled multifamily home did not allow the EM&V team to make further comparisons. These in the past have allowed for further comparing end uses and gaining insight into an interim step in the Beacon modeling process. The QA/QC documentation received indicated slightly higher overall air infiltration (125 percent) and higher duct leakage (130 percent) than modeled. The QA/QC documentation did not describe a justification for these increased levels. The EM&V team recognizes the testing was performed on occupied units and may have a potential influence; however, we also recognize that these values are reasonable for the building space of these units.

Across the three desk reviews the EM&V team completed, we saw a slight variation in realization rates across the three projects (between approximately 50 percent and 150 percent). The realization rate variation is likely a direct result of the fact that we do not have access to the Beacon modeling tool in its entirety, which accounts for additional processing. Overall, the EM&V team's attempts at reproducing this program's results are consistent with what we have seen for review of other similar home simulations, resulting in an overall realization rate of 100 percent for both kW and kWh.

⁸ 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. <http://www.archenergy.com/products/remrate>.



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, calculation methodology, specifications) for 11 of the 12 sites that had desk reviews completed because sufficient documentation was provided for the sites. Since sufficient documentation was provided for 90 percent or more of the sampled sites, the program documentation for these estimates is good.

D. Advanced Lighting Residential Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.5%	797	1,195	150.0%	5.6%	8,617,731	6,239,064	72.4%	Limited

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 small sample sizes.

Evaluated savings for the Advanced Lighting Residential MTP resulted in realization rates of 150 percent for kW and 72 percent for kWh. For this program the PY2014 evaluation efforts focused on desk reviews. The realization rates were driven by savings adjustments made from desk review results.

From the desk reviews, the evaluation found reported lighting savings for all projects in this program were calculated using a custom program savings methodology in alignment with that used in the current Texas TRM for nonresidential LEDs. The methodology clearly indicates the algorithms used and also provides multiple tables indicating values for key input assumptions, such as stipulated hours of use, in service rates, coincidence factors, and some baseline wattages for exceptional bulb types. This methodology, however, was lacking reference as to how these key input variables were developed and were not based on Commission-approved values for residential LEDs. Therefore the EM&V team evaluated program savings based on the Texas TRM Version 3.0, Volume 2 for residential measures, which is the first TRM that includes residential LEDs. As the claimed savings were derived for lighting product types, which were common to multiple stores participating in the program, the evaluation completed savings adjustments for all program participants, which resulted in generating evaluated results for a census of the program savings.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for 39 of the 73 product types claimed by the program as part of the desk reviews completed because sufficient documentation was provided. For 34 product types, the evaluation was unable to clearly verify the baseline and/or new product specifications used for the savings. The values provided were noted as reasonable, and the evaluation was able to fully verify a portion of the lamps; however, many remain unverified. Since sufficient



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

documentation was provided for less than 70 percent of the sampled sites, the program documentation for these estimates is limited.

E. EnergyWise Resource Action Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.3%	459	459	100.0%	1.5%	2,243,023	2,243,023	100.0%	Good

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 CenterPoint’s EnergyWise Resource Action MTP were the same as the claimed savings; thus, realization rates for both kW and kWh are 100 percent.

Tracking system data is generally in agreement with the data in the project documentation, which is solely based on returned surveys and the coding of those surveys. No discrepancies were found across the ten surveys reviewed.

The EM&V team requested all project documentation associated with each sampled project, including the survey instrument, survey coding key, coded data, any calculators used, and any available program manuals. What the EM&V team received for each project was the survey instrument, survey coding key, and coded data. The EM&V team also received from the implementer the EnergyWise Program Summary Report for 2014, which included information about savings attributable to each kit component.

Because the EM&V team received sufficient documentation for all sampled sites, we were able to verify key inputs and assumptions, resulting in a program documentation score of good.



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

F. Home Performance with ENERGY STAR® Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.0%	20	20	100.0%	0.0%	54,172	54,172	100.0%	Good

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 small sample sizes.

Evaluated savings for CenterPoint’s Home Performance with ENERGY STAR® MTP were the same as the claimed savings; thus, realization rates for both kW and kWh are 100 percent.

The EM&V team requested all project documentation associated with each sampled project, including the customer application and invoice, any calculators used, and reports of QA/QC or M&V activity if conducted. The EM&V team received for each project measure savings document sheets, customer invoices, and the savings calculator. For all sampled projects, the EM&V team reviewed CenterPoint’s project documentation and compared the claimed savings against the Texas TRM.

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

3.3.3 Low-income market transformation

A. Agencies in Action Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
2.3%	3,634	3,626	99.8%	2.9%	4,487,286	4,446,003	99.1%	Good

Completed Desk Reviews*	On-site M&V
21	8

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

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.



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

Evaluated savings for the CenterPoint Agencies in Action program were 3,626 kW and 4,446,003 kWh, with realization rates of 100 percent and 99 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

i. Data review

The data review realization rates are 99 percent for energy savings and 100 percent for demand savings, rounded to the nearest percent. 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 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.

Duct sealing heating type. Savings calculated for duct sealing measures depend on the heating equipment type installed in the treated home. In five instances, the team found that the ex-ante savings were calculated using heating equipment types that differed from those reflected in the tracking data. The team recalculated ex-post savings using the heating equipment type indicated in the tracking data.

Legacy deemed savings values. The team determined that the data review realization rates were influenced by application of deemed savings from petition 27903 for installations of ENERGY STAR® refrigerator measures. These deemed savings values have been superseded by petition 38025, which is the basis for refrigerator savings in TRM V1.0. Nevertheless, savings for these measures account for 4 percent of evaluated energy savings and 1 percent of demand savings for the CenterPoint Agencies in Action program, and therefore do not greatly influence this program's realization rate.

Air infiltration eligibility requirements. While TRM V1.0 contains several eligibility requirements for the infiltration reduction measure, low-income programs are exempt from



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

these requirements. The TRM applies a cap of 4.0 CFM₅₀ per square foot to the pre-treatment infiltration against which contractors can claim savings. In this program, application of this requirement in the ex-ante savings calculation led to differences between the reported and evaluated savings values for two projects. This resulted in an increase in the realization rate.

Furthermore, for health and safety reasons, final ventilation levels are specified within the TRM, with savings not awarded for reducing leakage below these levels. In one home, post-treatment infiltration levels fell below the minimum final ventilation. Ex-post savings calculated for this home was based on reduction to the minimum ventilation level; however, ex-ante savings for this home were calculated for the full reduction (i.e., the minimum ventilation limit was not applied).

Low-flow showerhead savings attribution. Data review realization rates were influenced by differing treatment of low-flow showerhead measures. Where multiple showerheads were installed in a home, the EM&V team awarded savings on a per-showerhead basis. However, in the ex-ante calculation savings appear to have been awarded per household. These changes resulted in a small 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 heat pump measures. The overall effect was a decrease 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 2 kWh and 0.001 kW.

ii. Desk review

Desk reviews were completed for 21 projects, and resulted in desk review realization rates of 100 percent for both energy and demand savings. No discrepancies were identified by the EM&V team through this review.

iii. Site visits

Site visits were conducted for eight projects, resulting in site visit realization rates of 100 percent for both energy and demand savings. All of the visited sites received desk reviews.

Air infiltration improvements. For one project, M&V field staff noted that the heating equipment type was a heat pump, while electric heat was recorded in the data tracking system for this customer. While the heat pump may have been installed concurrent to or following program participation, the field staff's observations nevertheless indicate that the participant would achieve savings consistent with a heat pump rather than an electric resistance furnace. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

Ceiling insulation. For another project, M&V field staff measured the R-value of pre-retrofit ceiling insulation to be R-1. However, the base ceiling insulation R-value in the tracking data system was R-5. At this same site, the heating system was found to be a heat pump, as opposed to the recorded electric heating type. Overall, the net impact of the two adjustments made based on on-site observations for this measure resulted in a minor increase in the site visit realization rate.

CFL installation. Discrepancies were also noted for one site where CFLs were installed. M&V field staff found eight CFL bulbs installed at the site, though 12 bulbs were recorded in the data tracking system. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

Solar screens. For two projects, M&V field staff noted that the heating equipment type was a heat pump, while electric heat was recorded in the tracking system. The adjustments made based on on-site observations for this measure resulted in a net increase in the site visit realization rate.

iv. Documentation

Documentation was requested for a total of 21 sites through the supplemental data request. Of these sites, documentation was provided for 21, all of which 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.

3.4 DETAILED FINDINGS—LOAD MANAGEMENT

3.4.1 Large Commercial Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
71.2%	113,303	113,303	100.0%	0.2%	311,583	311,583	100.0%	Good

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 PY2014 evaluation activities found that the individual participant load impact calculations in the work papers supplied to the EM&V Team were the same as those validated by using the individual customer interval load data. There were 243 reported program participants participating in 2014, and this is the number of participants for which the evaluation team received work papers and interval load data. One event (7/7) lasting three hours was called during the summer of 2014.



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

Evaluated savings for the CenterPoint Large Commercial Load Management Standard Offer Program were 113,303 kW and 311,583 kWh. The realization rate for kW was 1.00 and the realization rate for kWh was also 1.00.

3.5 DETAILED FINDINGS—PILOTS

3.5.1 Sustainable Schools Pilot Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.3%	484	484	100.0%	0.6%	885,291	885,291	100.0%	Fair

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 the Sustainable Schools Pilot MTP were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent. For this program the PY2014 evaluation efforts focused on desk reviews. There were no adjustments to any of the projects savings calculations reviewed.

The EM&V team was able to verify key inputs and assumptions (e.g., calculation methodologies and specifications) for three of the four sites that had desk reviews completed because sufficient documentation was provided for the sites. In particular, the evaluation did not receive the final M&V report for one of the projects. Since sufficient documentation was provided for 75 percent of the sampled sites, the program documentation for these estimates is fair.

3.5.2 Pool Pump Pilot Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.1%	101	101	100.0%	0.2%	369,078	369,078	100.0%	Good



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

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 the Pool Pump Pilot MTP resulted in realization rates of 100 percent for both kW and kWh. For this program the PY2014 evaluation efforts focused on desk reviews. The realization rates were driven by CenterPoint responding to savings adjustments made from desk review results and further described below.

From the desk reviews, the evaluation corrected two errors in the demand savings calculation. One error corrected by the evaluation was how the claimed savings were calculating the new pump kW. A summation of the pump settings was originally used, which overestimated the new pump's kW. The evaluation used an average. The second error corrected by the evaluation was how the claimed savings were calculating the old/replaced pump kW. The algorithm used was not in alignment with the methodology described and was essentially squaring the horsepower and grossly overestimating the old pump's ratings. The evaluation found the methodology documented for calculating the old pump demand was reasonable and adjusted the savings accordingly. As these two demand errors were common to all projects in the program, the evaluation completed savings adjustments for all program participants, which resulted in generating evaluated results for a census of the program savings. The EM&V team communicated this issue to CenterPoint, who subsequently filed an errata to their EEPR and therefore the kW realization rate improved for the final version of this report.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for four of the four 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 for these estimates is good.

3.5.3 Retail Electric Provider Pilot MTP Program (Nonresidential)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
1.3%	2,014	2,014	100.0%	3.9%	5,909,496	5,909,496	100.0%	Good

Completed Desk Reviews*	On-site M&V
30	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.



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

Evaluated savings for the Nonresidential Retail Electric Provider Pilot MTP were the same as the claimed savings; thus, realization rates were 100 percent for both demand and energy.

For the tune-up measures, and as a follow up to Recommendation #2a from the PY2013 Statewide Report, the EM&V team completed a comprehensive review of the tune-up measures. Our activities focused on comparing the stipulated/ modeled M&V approach to the full M&V approach for this particular measure at the statewide level.⁹

To support this impact evaluation activity for PY2014, the EM&V team completed a tracking system review. The main issues initially found with the tracking system were that test out values were incorrectly labelled as test in values. The EM&V team discussed this issue with the implementer early on and the variable labelling was fixed in subsequent datasets.

Next, the EM&V team completed desk reviews for a select sample of projects. Because of our understanding of how tune-ups were being conducted in the field, we drew a random sample of tune-up measures instead of a stratified sample by tune-up methodology type (stipulated/ modeled M&V approach versus the full M&V approach). What the EM&V learned throughout the course of completing the desk reviews and working with the implementer is that the full EM&V approach was actually more reflective of the stipulated approach. Given this, the EM&V team would have drawn more sample from the full M&V approach and less from the stipulated approach.

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 customer application and invoice, any calculators used, and reports of QA/QC or M&V activity if conducted. What the EM&V team received for most projects was the Incentive Check Request and the Tune-up Data Collection Sheet (contractor field reports). The implementer also provided program documentation including the Retail Electric Provider CoolSaver 2014 Program Manual.

Additionally, the desk review process included replicating the tune-up methodologies provided by the implementer to the extent possible. Because a key component of the tune-up methodology is the efficiency loss, the EM&V team investigated to determine actual efficiency loss/improvements in comparison to the stipulated values. While the EM&V team was not able to fully replicate the process by which the implementer determined the efficiency loss (e.g., conduct a complete regression analysis, whereby removing project outliers), our cursory review of the efficiency loss numbers recorded by the implementer generally align with the EM&V team's assessment. As result, there was no effect on savings for the tune-up measures. The EM&V team also found that overall in Texas a significant increase (156 percent) in the number of tune-ups completed has occurred over the last three years.

The project documentation and raw data files included enough information that critical inputs to calculating savings could be determined and compared to the Retail Electric Provider CoolSaver 2014 M&V Plan. The challenges the EM&V team encountered were that the full

⁹ Recommendation #2a stated: "From PY2012 to PY2013, the mix of deemed and custom measures funded through the commercial sector programs remained fairly consistent. However, the EM&V team recommends considering establishing deemed values for air conditioning tune-ups for both sectors that were part of both program years. Most TRMs do include air conditioning tune-up as a deemed measure."



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

M&V tune-up methodology was essentially the same as the stipulated methodology. We learned that the additional data points being collected in the field in PY2014 as part of the full M&V process by the implementer were not directly being used to calibrate the model and hence not directly affecting current PY2014 projects. Additionally, the field reports did not indicate that the condenser coil was cleaned or that the airflow was adjusted to proper CFM/ton per the Retail Electric Provider CoolSaver A/C Tune-up Program Manual. The manual does not include the methodology to adjust measured capacity and EERs to ARI conditions, which is a key step needed to verify those values. Additionally, all six steps required to complete the tune-ups may have been performed, but supporting documents do not clearly indicate all tasks were completed.

Currently, the PUCT has not approved a deemed savings value or deemed calculation method for tune-up measures. Until such an approval is given, regular calibrations of the model being used to develop these critical savings factors should be completed annually at a minimum.

Results of the tune-up evaluations continue to support Recommendation #2a from PY2013, in that the tune-up measure should be a deemed value or deemed calculation measure and that a full M&V process is not needed. This recommendation is supported by the fact that other similar programs in the same region (in particular, Arkansas), have deemed savings for tune-up measures that are based on refrigerant charge adjustments.

Because the EM&V team received sufficient documentation for all sampled sites, we were able to verify key inputs and assumptions. As a result, the program documentation score for these estimates is good.

3.5.4 Retail Electric Provider Pilot MTP Program (Residential)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
1.6%	2,623	2,623	100.0%	5.1%	7,837,657	7,837,657	100.0%	Good

Completed Desk Reviews*	On-site M&V
5	6

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

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 Residential Retail Electric Provider Pilot MTP were the same as the claimed savings; thus, realization rates were 100 percent for both demand and energy.

For the tune-up measures, and as a follow up to Recommendation #2a from the PY2013 Statewide Report, the EM&V team completed a comprehensive review of the tune-up



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

measures. Our activities focused on comparing the stipulated/ modeled M&V approach to the full M&V approach for this particular measure at the statewide level.¹⁰

To support this impact evaluation activity for PY2014, the EM&V team completed a tracking system review. The main issues initially found with the tracking system were that test out values were incorrectly labelled as test in values. The EM&V team discussed this issue with the implementer early on and the variable labelling was fixed in subsequent datasets.

Next, the EM&V team completed desk reviews for a select sample of projects. Because of our understanding of how tune-ups were being conducted in the field, we drew a random sample of tune-up measures instead of a stratified sample by tune-up methodology type (stipulated/modeled M&V approach versus the full M&V approach). What the EM&V learned throughout the course of completing the desk reviews and working with the implementer is that the full EM&V approach was actually more reflective of the stipulated approach. Given this, the EM&V team would have drawn more sample from the full M&V approach and less from the stipulated approach.

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 customer application and invoice, any calculators used, and reports of QA/QC or M&V activity, if conducted. What the EM&V team received for most projects was an invoice from the Incentive Check Request and the Tune-up Data Collection Sheet (contractor field reports). The implementer also provided the Retail Electric Provider CoolSaver 2014 M&V Plan.

Additionally, the desk review process included replicating the tune-up methodologies provided by the implementer, to the extent possible. Because a key component of the tune-up methodology is the efficiency loss, the EM&V team investigated to determine actual efficiency loss/improvements in comparison to the stipulated values. While the EM&V team was not able to fully replicate the process by which the implementer determined the efficiency loss (e.g., conduct a complete regression analysis, whereby removing project outliers), our cursory review of the efficiency loss numbers recorded by the implementer generally align with the EM&V team's assessment. As result, there was no effect on savings for the tune-up measures. The EM&V team also found that overall in Texas a significant increase (156 percent) in the number of tune-ups completed has occurred over the last three years.

The project documentation and raw data files included enough information that critical inputs to calculating savings could be determined and compared to the Retail Electric Provider CoolSaver 2014 M&V Plan. The challenges the EM&V team encountered were that the full M&V tune-up methodology was essentially the same as the stipulated methodology. We learned that the additional data points being collected in the field in PY2014 as part of the full M&V process by the implementer were not directly being used to calibrate the model and hence not directly affecting current PY2014 projects. Additionally, the contractor field reports did not indicate that the condenser coil was cleaned or that the airflow was adjusted to proper

¹⁰ Recommendation #2a stated: "From PY2012 to PY2013, the mix of deemed and custom measures funded through the commercial sector programs remained fairly consistent. However, the EM&V team recommends considering establishing deemed values for air conditioning tune-ups for both sectors that were part of both program years. Most TRMs do include air conditioning tune-up as a deemed measure."



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

CFM/ton per the Retail Electric Provider CoolSaver A/C Tune-up Program Manual. The manual does not include the methodology to adjust measured capacity and EERs to ARI conditions, which is a key step needed to verify those values. Additionally, all six steps required to complete the tune-ups may have been performed, but supporting documents do not clearly indicate all tasks were completed.

Currently, the PUCT has not approved a deemed savings value or deemed calculation method for tune-up measures. Until such an approval is given, regular calibrations of the model being used to develop these critical savings factors should be completed annually at a minimum.

Results of the tune-up evaluations continue to support Recommendation #2a from PY2013, in that the tune-up measure should be a deemed value or deemed calculation measure and that a full M&V process is not needed. This recommendation is supported by the fact that other similar programs in the same region (in particular, Arkansas), have deemed savings for tune-up measures that are based on refrigerant charge adjustments.

In addition to the tune-up measures, the Retail Electric Provider CoolSaver program claimed savings for 2,994 LEDs. For these measures, the EM&V team completed a census review of both the tracking system and verification of savings. For Texas, LEDs are addressed in TRM Version 3.0, which is what the EM&V team used to evaluate LED savings for this program. We determined that the savings claimed generally align (but were not exact) with TRM Version 3.0. However, we do recommend that the Retail Electric Provider Program Manual be updated for PY2015 and beyond to clarify savings algorithms for this measure.

Because the EM&V team received sufficient documentation for all sampled sites, we were able to verify key inputs and assumptions. As a result, the program documentation score for these estimates is good.

3.5.5 Residential Ecofactor Pilot Load Management Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.1%	160	160	100.0%	0.0%	1,921	1,921	100.0%	Good

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.

This residential smart thermostat pilot program was new in 2014. The PY2014 evaluation activities found that the individual participant load impact calculations in the work papers supplied to the EM&V Team were virtually the same as those validated by using the individual customer interval load data. There were 159 reported program participants in 2014, which



3. Impact Evaluation Results—CenterPoint Energy Houston Electric, LLC...

matched the data the evaluation team received. Four events (7/7, 7/28/, 8/26, and 9/9) were called during the pilot. The event durations were all three hours in duration.

Evaluated savings for the CenterPoint Residential Ecofactor Pilot Load Management program were 160 kW and 1,921 kWh. The discrepancy in the kW impact was most like due to rounding and of no significance. The realization rate for kW was 100 percent and the realization rate for kWh was also 100 percent.

3.5.6 Residential EarthNetworks Pilot Load Management Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
2.4%	3,743	3,743	100.0%	0.0%	44,916	44,916	100.0%	Good

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.

This residential smart thermostat pilot program was new in 2014. The PY2014 evaluation activities found that the individual participant load impact calculations in the work papers supplied to the EM&V Team were virtually the same as those validated by using the individual customer interval load data. There were 2,479 reported program participants in 2014, which matched the data the evaluation team received. Four events (7/7, 7/28/, 8/21, and 8/25) were called during the pilot. The event durations were all three hours in duration.

Evaluated savings for the CenterPoint Residential EarthNetworks Pilot Load Management Program were 3,743 kW and 44,916 kWh. The realization rate for kW was 100 percent and the realization rate for kWh was also 100 percent.



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.

4.1 KEY FINDINGS

4.1.1 Evaluated savings

El Paso Electric’s evaluated savings for PY2014 were 13,181 for demand (kW) and 20,485,734 energy (kWh) savings. The overall kW portfolio realization rate is just under 100 percent, largely due to the 100 percent realization rate for the load management program, which contributes the majority of overall portfolio kW. The overall portfolio realization rate for kWh is 93 percent due to evaluated savings adjustments across a few programs.

The primary adjustments from claimed to evaluated savings included the EM&V team changing custom projects with insufficient documentation to support custom values and analysis to Commission-approved deemed savings calculations, the EM&V team changing building types used in the claimed savings calculations, adjusting a custom project’s M&V results, and the EM&V team’s on-site M&V.

Table 4-1 shows the claimed and evaluated demand savings for El Paso Electric’s portfolio and broad customer sector/program categories for PY2014.

Table 4-1. El Paso Electric Program Year 2014 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Precision at 90% Confidence
Total Portfolio		13,389	13,181	98.4%	2.0%
Commercial Sector	25.8%	3,455	3,323	96.2%	7.0%
Residential Sector	10.3%	1,378	1,302	94.5%	9.9%
Load Management*	61.8%	8,281	8,281	100.0%	0.0%
Pilots	2.1%	275	275	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 PY2014.



4. Impact Evaluation Results—El Paso Electric Company...

Table 4-2. El Paso Electric Program Year 2014 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2014 Claimed Demand Savings (kWh)	2014 Evaluated Demand Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		22,117,836	20,485,734	92.6%	9.4%
Commercial Sector	80.9%	17,903,867	16,276,927	90.9%	11.8%
Residential Sector	16.5%	3,638,590	3,633,428	99.9%	3.2%
Load Management*	0.1%	12,422	12,422	100.0%	0.0%
Pilots	2.5%	562,958	562,958	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. Program-level results should only be used to provide insight into how individual programs are affecting the overall portfolio realization rates.**

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 fair kW program documentation score and a limited kWh program documentation score for PY2014. As program documentation recommendations from the PY2012 EM&V effort are to come into effect in PY2014, the EM&V team did expect program documentation scores to improve between PY2012 and PY2014.

4.1.2 Cost-effectiveness results

El Paso Electric’s overall portfolio had an evaluated cost-effectiveness of 2.17.

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. LivingWise MTP was the only program that did not pass cost effectiveness based on



4. Impact Evaluation Results—El Paso Electric Company...

evaluated savings results. The pilot program was not required to pass cost-effectiveness since it is within the first two years of operation.

The lifetime cost of evaluated PY2014 savings was \$0.013 per kWh and \$22.61 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	2.32	2.17	1.91
Commercial Sector	3.35	3.07	2.67
Commercial SOP	4.28	4.28	3.44
Small Commercial Solutions MTP	2.28	2.28	2.05
Large C&I Solutions MTP	3.96	3.31	2.81
Texas SCORE MTP	2.94	2.94	2.73
Appliance Recycling MTP (COM)	2.35	2.35	1.64
Residential Sector	1.40	1.36	1.18
Residential Solutions MTP	1.89	1.89	1.51
LivingWise MTP	0.34	0.34	0.27
Hard-to-Reach Solutions MTP	1.57	1.48	1.48
Appliance Recycling MTP (RES)	2.26	2.26	1.58
Load Management	1.02	1.02	1.02
Load Management SOP	1.02	1.02	1.02
Pilots	1.58	1.58	1.50
Commercial Rebate Pilot Program	0.79	0.79	0.67
Solar PV Pilot MTP (COM)	1.59	1.59	1.60
Solar PV Pilot MTP (RES)	1.66	1.66	1.59



4. Impact Evaluation Results—El Paso Electric Company...

4.2 DETAILED FINDINGS—COMMERCIAL

4.2.1 Commercial Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
3.0%	398	398	100.1%	9.9%	2,197,030	2,197,030	100.0%	Limited

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 PY2014 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. These adjusted kWh realization rates ranged from 83 percent to 115 percent.

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

Project ID #746685: During the on-site M&V visit, the EM&V team found that the retrofit equipment chiller had replaced an older chiller and determined that this project type was early retirement instead of the ex-ante consideration of new construction. In addition, the EM&V team found that the retrofit equipment chiller efficiency was 10.3 EER instead of the as-claimed value of 10.2 EER, resulting in an upward change in the demand savings of over 5 percent. These adjustments resulted in a 15 percent increase in the evaluated savings, providing a 115 percent realization rate for both energy and demand savings.

Project ID #746689: Per the desk review findings, the EM&V team changed the project calculation algorithm to match a deemed calculation. The desk review found that there was no documentation supporting the use of a custom calculator. The use of a custom calculator is an acceptable method if there is documentation of why it is being used, and how the values are being calculated. These updates to the project savings methodology resulted in a 17 percent decrease in the evaluated savings from the reported savings, resulting in an 83 percent realization rate for both energy and demand savings. As evident from the reason for savings gap above, the site had insufficient documentation, the lack of completeness of which caused the calculation method to be changed to a deemed calculator. This site did not receive an on-site M&V visit.



4. Impact Evaluation Results—El Paso Electric Company...

Project ID #690915: This project entailed lighting replacements. The EM&V team found that the building type was incorrectly classified as an office building. After investigating the facility type through site photographs and online lookups, the facility was determined to be a warehouse and the savings were updated accordingly. The realization rate for this project is 94 percent. There were no changes in the claimed demand savings value, which has a realization rate of 100 percent. No on-site verification was performed at this site.

Project ID #746683: The EM&V team found an error in the baseline fixture wattage for this lighting replacement project. The baseline lamp wattage was incorrectly input as 30W into the calculator; however, based on the photos from the site, which show a 40W lamp, the EM&V team updated the baseline lamp wattage, which resulted in higher savings. The realization rate for this project is 105 percent with a demand savings realization rate of 103 percent. This site did not receive an on-site M&V visit.

As part of the PY2012 evaluation report, 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 two out of the ten (20 percent) of the 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 building types, equipment quantities and equipment specifications (wattages, efficiencies, ballast factors, etc.). Because sufficient documentation was provided for fewer than 70 percent of the projects in the sample, the EM&V team assigned a program documentation score of limited for the El Paso Electric CSOP PY2014 projects.

In addition to the program documentation recommendations in the PY2012 report, the EM&V team also recommended that the utility should include information on the end uses affected by measure installations as well as detailed measure descriptions for all of the sites and line items entered into the tracking system. The recommendation appears to have not been implemented as the tracking data only provides details on the calculator type. In addition to the calculator type, it would be useful to provide details on end-uses, broken down into the following categories: Lighting, HVAC, Building Envelope, Food Service Equipment, Refrigeration, and Miscellaneous, which will be consistent with the Texas TRM. Additional measure-level details should also be provided, at a minimum, consistent with the TRM measure sub-categories.



4. Impact Evaluation Results—El Paso Electric Company...

4.2.2 Commercial Market Transformation Programs

A. Large C&I Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
11.7%	1,563	1,431	91.6%	39.0%	8,632,935	7,009,943	81.2%	Limited

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

Evaluated savings for the Large C&I Solutions MTP resulted in realization rates of 92 percent for demand and 81 percent for energy. The realization rates were mainly driven by savings adjustments made from desk reviews and on-site survey results. A total of six projects had realization rates that were not equal to 100 percent and were adjusted. These adjusted realization rates ranged from 37 to 99 percent for demand and 46 to 99 percent for energy. From the six projects with adjusted realization rates, four projects were found to be a major driver for the lower demand and energy realization rates and had savings adjusted by 5 percent or more.

The project specific savings adjustments that were the major drivers of the program level realization rate are listed below by Project ID:

Project ID #730395: The reported savings methodology within the program tracking system applied for the lighting measures was deemed. However, custom building hours of use and demand coefficients were utilized without M&V documentation to support such custom savings assumptions. Also, a second deemed building type of Office was also utilized within the same calculator. Per the project documentation assessed as part of the desk review and onsite survey results, the building type was changed to one predominant Warehouse (Non-Refrigerated) building type. This building type also matches the building type used by a second facility at the site that was also rebated at the same time for a similar lighting project. This resulted in a drop in operating hours and demand coefficients. These findings decreased energy and demand savings (site #730395 kWh realization rate equal to 49 percent and kW realization rate equal to 84 percent).

Project ID #735155: The reported savings methodology for this project was custom M&V utilizing a IPMVP, Option C for whole facility analysis. The original M&V plan incorporated a normalization of variables such as weather. However, these variables were removed due to weak correlations and changed to a whole facility analysis based



4. Impact Evaluation Results—El Paso Electric Company...

on hours of production and utility data. The evaluation found that outliers in data were not removed. The evaluation also found that other variables were not assessed or included, such as direct equipment impacts (e.g., air conditioning, chilled water cooling, machine loading), for which the savings generated would be limited to. These variables were not presented or removed from the baseline conditions. With limited data, the evaluation followed an approach to remove the low and high production months for pre- and post-data sets to further normalize the data for comparison. Prior to this, the data set contained several low and one high month of production that skewed the data set when compared to the limited post-project data set. As a result, the average peak kW and kWh were reduced. These findings decreased energy and demand savings (site #735155 kWh realization rate equal to 50 percent and kW realization rate equal to 37 percent).

As this project was focused around insulation for plastic injection molding machines, savings generated would be limited to reductions in machine cycling, chilled water, air conditioning demands, etc. Thus, maximum savings would be limited by these equipment load changes. The current M&V plan does not take this into consideration. Detailed equipment information would be necessary to complete additional analysis.

Project ID #748617: The reported savings methodology within the program tracking system applied for the lighting measures was deemed. However, custom building hours of use and demand coefficients were utilized without M&V documentation to support such custom savings assumptions. Per the project documentation assessed as part of the desk review results, the building type was changed to the predominant deemed Manufacturing building type. This resulted in a drop in operating hours and demand coefficients. These findings decreased energy and demand savings (site #748617 kWh realization rate equal to 67 percent and kW realization rate equal to 74 percent).

Project ID #750567: The reported savings methodology within the program tracking system applied for the lighting measures was deemed. However, custom building hours of use and demand coefficients were utilized without M&V documentation to support such custom savings assumptions. Per the project documentation assessed as part of the desk review results, the building type was changed to the predominant deemed Manufacturing building type. This resulted in a drop in operating hours and demand coefficients. These findings decreased energy and demand savings (site #750567 kWh realization rate equal to 92 percent and kW realization rate equal to 96 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, specifications, and/or custom savings methodologies) for 10 of the 15 sites that had desk reviews completed because sufficient documentation was provided for the sites. Since sufficient documentation was provided for 67 percent of the sampled sites, the program documentation score for these estimates is limited.

i. Tune-up measures

Desk reviews were completed for one project site that involved multiple tune-up measures. The reported savings methodology within the program tracking system applied for the tune-up measures was M&V. As measure-level calculation inputs were available within the tracking system for the El Paso Electric Large C&I Solutions MTP, the EM&V team was able to calculate energy savings for each unit that received a tune-up.



4. Impact Evaluation Results—El Paso Electric Company...

The challenges the EM&V team encountered were that the full M&V tune-up methodology was essentially the same as the stipulated methodology measures also used by the program. We learned that the additional data points being collected in the field in PY2014 as part of the full M&V process by the implementer were not directly being used to calibrate the model and hence not directly affecting current PY2014 projects. Additionally, the contractor invoices and field reports did not indicate that the condenser coil was cleaned or that the airflow was adjusted to proper CFM/ton per the CoolSaver A/C Tune-up Program Manual. The manual does not include the methodology to adjust measured capacity and EERs to ARI conditions, which is a key step needed to verify those values. Additionally, all six measures steps required for CoolSaver to complete the tune-ups may have been performed, but supporting documents do not clearly indicate all tasks were completed.

Currently, the PUCT has not approved a deemed savings value or deemed calculation method for tune-up measures. Until such an approval is given, regular calibrations of the model being used to develop these critical savings factors should be completed annually at a minimum. Additional findings of a census review completed for all tune-up measures for all Texas programs in PY2014 is provided separately.

B. Small Commercial Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
5.5%	740	740	100.0%	14.1%	3,123,603	3,123,603	100.0%	Good

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.

Evaluated savings for the Small Commercial Solutions MTP were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent. There were no adjustments to any of the savings calculations.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for ten of the ten 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 for these estimates is good.



4. Impact Evaluation Results—El Paso Electric Company...

i. Tune-up measures

Desk reviews were completed for one project site that involved one tune-up measure. The reported savings methodology within the program tracking system applied for the tune-up measure was M&V. As measure-level calculation inputs were available within the tracking system for the El Paso Electric Small Commercial Solutions MTP, the EM&V team was able to calculate energy savings for the unit that received a tune-up.

The challenges the EM&V team encountered for the tune-up measures discussed above also apply to this program.

C. Texas SCORE Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
5.6%	754	752	99.8%	17.9%	3,948,043	3,944,095	99.9%	Fair

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.

Evaluated savings for the SCORE MTP were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent. There were no adjustments to any of the savings calculations.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for four of the five sites that had desk reviews completed because sufficient documentation was provided for the sites. Since sufficient documentation was provided for 80 percent of the sampled sites, the program documentation for these estimates is fair.



4. Impact Evaluation Results—El Paso Electric Company...

4.3 DETAILED FINDINGS—RESIDENTIAL

4.3.1 Residential Market Transformation Programs

A. Appliance Recycling Market Transformation Program (Residential & Nonresidential)

	Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
Res	1.8%	244	244	100.0%	7.2%	1,588,224	1,588,224	100.0%	Good
Com	0.0%	0	0	100.0%	0.0%	2,256	2,256	100.0%	Good

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.

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 El Paso Electric’s Appliance Recycling MTP were the same as the claimed savings; thus, realization rates for both kW and kWh are 100 percent. For PY2014, this program included two small commercial projects, which are reflected in the program summary table, above.

The realization rates for this program are driven by no savings adjustments made to all measures, both residential and small commercial.

In completing the PY2012 tracking system and desk reviews, the EM&V team could not identify the source of the deemed savings values used to calculate claimed savings for El Paso Electric’s Appliance Recycling Program. Through correspondence with El Paso Electric regarding the source of the claimed savings, the EM&V team learned that El Paso Electric used values of 0.192 kW and 1,176 kWh per unit to calculate the program’s claimed savings in PY2012. While the values used for the PY2012 claimed savings appear reasonable, they had not been approved by the Commission for use in Texas nor were they based on program year M&V results as required in § 25.181.

As a result of the PY2012 review and correspondence with both El Paso Electric and the PUCT in PY2013, the EM&V team recommended that El Paso Electric submit a petition to approve revised savings estimates. The petition was submitted in January 2014, and the revised savings values of 0.173 kW and 1,128 kWh are used for PY2014.

Because the EM&V team received sufficient documentation for all sites, the program documentation score for these estimates is good.



4. Impact Evaluation Results—El Paso Electric Company...

B. LivingWise® Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.7%	89	89	100.0%	2.0%	449,905	449,905	100.0%	Good

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.

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 El Paso Electric's LivingWise MTP were 449,940 kWh and 89 kW, with realization rates of 100 percent for each.

The realization rates were driven by El Paso Electric responding to the EM&V team's recommendations for savings adjustments. Evaluated savings were originally less than claimed savings as there are no Commission approved deemed savings for the FilterTone Alarm or the energy efficiency night light kit components.

The first phase of impact evaluation the EM&V team completed was a tracking system review. Tracking system data is generally in agreement with the data in the project documentation, which is solely based on returned surveys and the coding of those surveys. No discrepancies were found across the ten surveys reviewed.

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 survey instrument, survey coding key, coded data, any calculators used, and any available program manuals. What the EM&V team received for each project was the survey instrument, survey coding key, and coded data. The EM&V team also received from the implementer the LivingWise Program Summary Report for 2014, which included information about savings attributable to each kit component.

The EM&V team reviewed El Paso Electric's stated algorithms and compared the claimed savings against those algorithms and the Texas TRM v1. Because the EM&V team received sufficient documentation for all sampled sites, we were able to verify key inputs and assumptions. Since sufficient documentation was provided for all sampled sites, the program documentation score for these estimates is good.



4. Impact Evaluation Results—El Paso Electric Company...

C. Residential Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
2.4%	322	322	100.0%	2.4%	524,974	524,974	100.0%	Good

Completed Desk Reviews*	On-site M&V
10	16

*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.

Evaluated savings for El Paso Electric’s Residential Solutions MTP match claimed savings, with realization rates of 100 percent for both kW and kWh savings.

The first phase of impact evaluation the EM&V team completed was a tracking system review, where it was found that duct sealing measures were not calculated in accordance with TRM V1.0, which initially decreased the program’s realization rate. El Paso Electric subsequently filed revised savings and the issue was resolved for the final impact report.

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 customer application and invoice, any calculators used, and reports of QA/QC or M&V activity if conducted. What the EM&V team received for each project was the pre and post pictures, customer invoices, savings calculation sheets, and the duct efficiency calculator.

The EM&V team reviewed El Paso Electric’s stated algorithms and compared the claimed savings against those algorithms and the Texas TRM V1.0. Because the EM&V team received sufficient documentation for all sampled sites, we were able to verify key inputs and assumptions. There were two desk reviews with some variance in ceiling insulation inputs, but they had an undetectable effect on the overall savings.

Site visits were conducted for ten projects, all of which received desk reviews. Site visit data generally supported the desk review findings.

Because sufficient supporting documentation for all sampled projects was received, the program documentation score is good.



4. Impact Evaluation Results—El Paso Electric Company...

4.3.2 Hard-to-Reach Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
5.4%	723	648	89.6%	4.9%	1,075,487	1,070,325	99.5%	Good

Completed Desk Reviews*	On-site M&V
68	10

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

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 El Paso Electric Hard-to-Reach Solutions MTP were 648 kW and 1,070,325 kWh, with realization rates of 90 percent and 100 percent, respectively.

Generally, the realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

However, for the El Paso Electric Hard-to-Reach Solutions MTP, no measure level inputs were provided to the EM&V team in the tracking system. Therefore the data review and desk review processes were combined. Project-specific documentation provided for the desk review were used to derive inputs that the team used to recalculate savings that were compared against those presented 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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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



4. Impact Evaluation Results—El Paso Electric Company...

A. Data review

Since there were no measure level inputs, data reviews were completed for 68 projects. The data review realization rates are 100 percent for both energy and demand savings, rounded to the nearest percentage point. 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.

i. Utility claimed savings modifications

These realization rates reflect a comparison between the EM&V team's evaluated savings and adjusted savings provided to the team by El Paso Electric following discussion of notable systematic differences in savings calculations among duct sealing measures. These adjustments resulted in a decrease in claimed energy savings of 34,932 kWh, and a decrease in claimed demand savings of 84 kW across the program.

In its initial review, the EM&V team found discrepancies for all reviewed duct sealing measures. Following a discussion with the program implementer, the EM&V team found that the implementer had applied savings values derived from a draft version of TRM Version 1.0 Volume 2 in its calculation of ex-ante savings for duct sealing measures. The program implementer subsequently updated the claimed savings for these measures to align with those in the filed TRM Version 1.0, which are consistent with the EM&V team's calculated ex-post savings.

ii. Claimed savings data review

In comparison against El Paso Electric's adjusted savings, the data review realization rate rounds to 100 percent, indicating that the program tracking data is very consistent with the values in the TRM. Minor differences between ex-ante and ex-post savings are due to rounding of calculation inputs and/or savings values. All identified variations due to rounding were within 3 kWh and 0.002 kW.

B. Desk review

As measure-level calculation inputs were not available within the tracking system for the El Paso Electric Hard-to-Reach Solutions MTP, the EM&V team could not determine through the desk review process whether discrepancies exist between tracked measure inputs and those found in project documentation.

C. Site visits

Site visits were conducted for ten projects, resulting in site visit realization rates of 100 percent and 90 percent for energy and demand savings, respectively, rounded to the nearest percentage point. All of the visited sites received desk reviews.

Duct improvements. Through the site review process, the EM&V team identified differences in the values used to calculate savings for duct efficiency improvement measures. Due to the nature of Duct Blaster tests, some variation is expected. For duct improvement measures,



4. Impact Evaluation Results—El Paso Electric Company...

variation in measured post-retrofit leakage is expected to be within ± 20 percent using a Duct Blaster test.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data values collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Discrepancies beyond ± 20 percent were noted for one of the two duct improvement projects. For this site, the team observed a difference in post-treatment leakage of 26 CFM₂₅. The EM&V team also verified that the heating system in this home was electric, instead of the gas heating equipment identified during the team's desk review. At the other site that performed duct improvements, recent home remodeling resulted in damage to the duct system and affected the persistence of these energy-saving improvements; as such, the team assigned zero savings for this project. Overall, the adjustments made based on on-site observations for this measure had a net effect of increasing the energy realization rate and decreasing the demand realization rate.

Ceiling insulation. Four sites that received ceiling insulation showed discrepancies in the square footage of installed insulation compared to those values reported in the project documentation. At one site, the team verified a larger treated area than the square footage reported, while at another site they verified a smaller treated area. For the two remaining projects, the team verified that claimed square footage had included the garage area, while ceiling insulation savings may only be claimed for installations over conditioned areas. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

Window installations. For both sites with upgraded window installations, on-site data collection showed different areas of installed windows than indicated in the project documentation. Values confirmed by the M&V team were marginally different from those reported in project documentation at one site, but were significantly larger at the other. Overall, the adjustments made based on on-site observations for this measure resulted in a net increase in the site visit realization rate.

D. Documentation

Documentation was requested for a total of 68 sites through the supplemental data request. All 68 of these sites provided 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. Impact Evaluation Results—El Paso Electric Company...

4.4 DETAILED FINDINGS—LOAD MANAGEMENT

4.4.1 Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
61.8%	8,281	8,281	100.0%	0.1%	12,422	12,422	100.0%	Good

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 PY2014 evaluation activities found that the individual participant load impact calculations in the work papers supplied were the same as those validated by using the individual customer interval load data. There were nine reported program participants in 2014 and this is the number of participants for which the evaluation team received work papers and interval load data. One event was called on June 13th during the summer of 2014, which lasted for two hours.

Evaluated savings for the El Paso Electric Load Management Standard Offer Program were 8,281 kW and 12,422 kWh. The realization rate for both kW and kWh was 100 percent.

4.5 DETAILED FINDINGS—PILOTS

4.5.1 PV/Solar Pilot Market Transformation Program (Nonresidential)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.1%	20	20	100.0%	0.2%	38,400	38,400	100.0%	Good



4. Impact Evaluation Results—El Paso Electric Company...

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.

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 PV/Solar Pilot MTP (Nonresidential) were 20 kW demand and 38,400 kWh annual energy, with realization rates of 100 percent.

Evaluated savings matched claimed exactly because the evaluation activities found no evidence of differences between installed and tracked system capacity. This finding was based on our three desk reviews of residential program. Evaluated savings estimates are based solely on installed capacity (DC) reported in the tracking system multiplied by the approved deemed savings calculations of 1,600 kWh and 0.83 kW per kW of capacity.

Because no desk reviews were completed for these four nonresidential installs, the evaluation leveraged results from the residential desk reviews for similar sites to evaluate savings. Based on the findings from the residential program documentation review, the EM&V team set the overall nonresidential program documentation score to good.

4.5.2 PV/Solar Pilot Market Transformation Program (Residential)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
1.8%	239	239	100.0%	2.1%	461,586	461,586	100.0%	Good

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 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.

Evaluated savings for the PV/Solar Pilot MTP (Residential) were 2,439 kW demand and 461,586 kWh annual energy, with realization rates of 100 percent.

Evaluated savings matched claimed savings because the evaluation activities found no evidence of differences between installed and tracked system capacity. This finding was based on our desk review of four installations and two on-site inspections. Evaluated savings estimates are based solely on installed capacity (DC) reported in the tracking system multiplied by the approved deemed savings calculations of 1,600 kWh and 0.83 kW per kW of capacity.



4. Impact Evaluation Results—El Paso Electric Company...

The EM&V team was able to verify 100 percent of the installed system capacity ratings in the tracking system based on our review of a sample of either inspection reports or final invoices to confirm reported system capacity. Installed capacity is the only input to the evaluated savings calculations for this program year so the overall program documentation score for inputs to this savings estimate is considered good.

4.5.3 Commercial Rebate Pilot Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.1%	16	16	100.0%	0.3%	62,972	62,972	100.0%	Fair

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 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.

Evaluated savings for the Commercial Rebate Pilot MTP were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent. There were no adjustments to any of the savings calculations.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for three of the four sites that had desk reviews completed because sufficient documentation was provided for the sites. For one site, El Paso Electric was unable to provide the EM&V team with the requested HVAC equipment heating fuel type for the site that installed HVAC energy management control measures. For this site, we were unable to verify the heat pump heating type selected for the deemed savings values. Also, no documentation was provided to confirm the temperature setback setting. Since sufficient documentation was provided for 75 percent of the sampled sites, the program documentation for these estimates is fair.



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.

5.1 KEY FINDINGS

5.1.1 Evaluated savings

Entergy’s evaluated savings for PY2014 were 17,819 for demand (kW) and 40,533,021 energy (kWh) savings with realization rates somewhat over 100 percent for both kW and kWh.

While minor adjustments were made across the commercial programs, the primary driver of the realization rates being higher than 100 percent were the RSOP and HTR programs. The systematic increases in these programs’ evaluated savings were the EM&V team awarding savings per low-flow showerhead installed where multiple measures were installed in a household versus the claimed savings, which only claimed one measure per household. In addition, the EM&V team’s on-site M&V findings across both programs resulted in somewhat higher evaluated savings for air infiltration measures than the claimed savings.

Table 5-1 shows the claimed and evaluated demand savings for Entergy’s portfolio and broad customer sector/program categories for PY2014.

Table 5-1. Entergy Program Year 2014 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kw)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kw)	Precision at 90% Confidence
Total Portfolio		17,180	17,819	103.7%	2.9%
Commercial Sector	22.9%	3,929	3,919	99.8%	2.5%
Residential Sector	42.1%	7,227	7,882	109.1%	6.4%
Load Management	35.1%	6,024	6,018	99.9%	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 PY2014.



Table 5-2. Entergy Program Year 2014 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2014 Claimed Demand Savings (kWh)	2014 Evaluated Demand Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		39,213,564	40,533,021	103.4%	5.4%
Commercial Sector	45.3%	17,751,570	17,745,894	100.0%	1.1%
Residential Sector	54.7%	21,450,338	22,775,471	106.2%	9.6%
Load Management	0.0%	11,656	11,656	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. Program-level results should only be used to provide insight into how individual programs are affecting the overall portfolio realization rates.**

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 PY2014. As program documentation recommendations from the PY2012 EM&V effort are to come into effect in PY2014, the EM&V team did expect program documentation scores to improve between PY2012 and PY2014.

5.1.2 Cost-effectiveness results

Entergy’s overall portfolio had a cost-effectiveness of 2.83.

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 PY2014 evaluated savings was \$0.01 per kWh and \$15.53 per kW.



5. Impact Evaluation Results—Entergy Texas, Inc....

Table 5-3. Entergy Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	2.72	2.83	2.37
Commercial Sector	3.04	3.03	2.67
Commercial Solutions MTP	3.87	3.87	3.29
SCORE/CitySmart MTP	2.20	2.19	2.04
Residential Sector	2.61	2.80	2.27
Residential SOP	3.08	3.36	2.62
Entergy Solutions High Perf. Homes MTP	2.80	2.80	1.97
Hard-to-Reach SOP	1.73	1.89	1.89
Load Management	1.48	1.48	1.48
Load Management SOP	1.48	1.48	1.48

5.2 DETAILED FINDINGS—COMMERCIAL

5.2.1 Commercial Market Transformation Programs

A. Commercial Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
13.8%	2,364	2,364	100.0%	30.4%	11,905,896	11,905,896	100.0%	Good

Completed Desk Reviews*	On-site M&V
13	1

*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.

Evaluated savings for the Commercial Solutions MTP were equal to the claimed savings, with realization rates of 100 percent for both demand and energy. There were no adjustments to any of the savings calculations.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for 13 of the 13 sites that had desk reviews completed because sufficient documentation was provided for the sites. The sufficient documentation also included



5. Impact Evaluation Results—Entergy Texas, Inc....

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 email documentation to support a project’s pre-existing lighting type selections. Since sufficient documentation was provided for all of the sampled sites, the program documentation score for these estimates is good.

i. Tune-up measures

Desk reviews were completed for one project site that involved numerous tune-up measures each. The reported savings methodology within the program tracking system applied for this tune-up measure was stipulated. As measure-level calculation inputs were available within the tracking system for the Entergy Commercial Solutions MTP, the EM&V team was able to calculate energy savings for the unit that received a tune-up.

The challenges the EM&V team encountered were that the full M&V tune-up methodology was essentially the same as the stipulated methodology measures also used by the program. We learned that the additional data points being collected in the field in PY2014 as part of the full M&V process by the implementer were not directly being used to calibrate the model and hence not directly affecting current PY2014 projects. Additionally, the contractor invoices and field reports did not indicate that the condenser coil was cleaned or that the airflow was adjusted to proper CFM/ton per the CoolSaver A/C Tune-up Program Manual. The manual does not include the methodology to adjust measured capacity and EERs to ARI conditions, which is a key step needed to verify those values. Additionally, all six measures steps required for CoolSaver to complete the tune-ups may have been performed, but supporting documents do not clearly indicate all tasks were completed.

Currently, the PUCT has not approved a deemed/stipulated savings value or deemed calculation method for tune-up measures. Until such an approval is given, regular calibrations of the model being used to develop these critical savings factors should be completed annually at a minimum. Additional findings of a census review completed for all tune-up measures is provided separately.

B. SCORE/CitySmart Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
9.1%	1,565	1,555	99.4%	14.9%	5,845,674	5,839,998	99.9%	Good



5. Impact Evaluation Results—Entergy Texas, Inc....

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

Evaluated savings for the SCORE/CitySmart MTP resulted in realization rates of nearly 100 percent for demand and energy. The adjustments made to the project savings calculations provided for insignificant differences in claimed versus evaluated savings.

As a result of desk reviews, four projects had realization rates that were not equal to 100 percent and were adjusted, with the remaining eight desk reviews having 100 percent realization rates. These adjusted realization rates ranged from 81 to 156 percent for energy and 81 to 189 percent for demand. The project specific savings adjustments were not major drivers of the program level realization rates due to their small contribution to overall program savings. However, as all four had savings adjusted by 5 percent or more, more detail regarding these findings is listed below by Project ID:

Project ID #734260: The old and new unit capacities found during the desk review varied slightly from reported values. The change in savings resulted in decreased project savings (site #734260 kWh realization rate equal to 93 percent and kW realization rate of 94 percent). The old and new equipment capacities were incorrectly inputted into the final calculator. The AHRI certificate provided to the EM&V team was used to verify new equipment capacities entered into the calculator.

Project ID #734996 (HVAC only): The new HVAC equipment efficiency found during the desk review varied slightly from reported (13 SEER versus 13 EER reported). The change resulted in decreased energy and demand savings (site #734996 kWh and kW realization rate equal to 81 percent).

Project ID #750469 (HVAC only): The reported building type used for the HVAC project was School (Secondary). However, this facility is part of a university campus that operates in alignment with the university schedule. Also, the University/College was the building type originally selected in the pre-inspection calculator and there were no notes as to why the building type was changed in the final inspection folder. The lighting project rebated within the same building used Education, Summer. Therefore, the predominant building type was changed to School (University/College). This resulted in an increase in operating hours and decrease in demand coefficient. These findings increased energy savings and decreased demand savings (site #750469 kWh realization rate equal to 156 percent and kW realization rate equal to 89 percent).

Project ID #750470 (lighting only): The reported building type used for the lighting project was Education, No Summer. The building is owned by a university; however, the facility type is a warehouse. The lighting project rebated within the same building used Warehouse as the predominant building type. According to site drawings and photos, the predominant building type was changed to Warehouse. This resulted in an increase in operating hours and demand coefficient. These findings increased energy and



5. Impact Evaluation Results—Entergy Texas, Inc....

demand savings (site #750470 kWh realization rate equal to 128 percent and kW realization rate equal to 189 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for 12 of the 12 sites that had desk reviews completed because sufficient documentation was provided for the sites. Information of particular assistance include final review/approval notes for modifications made to project savings after post inspections. 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

5.3.1 Residential Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
22.2%	3,806	4,272	112.3%	35.0%	13,709,702	14,717,365	107.4%	Good

Completed Desk Reviews*	On-site M&V
45	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.

Evaluated savings for the Entergy Residential SOP were 4,272 kW and 14,717,365 kWh, with realization rates of 112 percent and 107 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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; and
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.



5. Impact Evaluation Results—Entergy Texas, Inc....

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

A. Data review

The data review realization rates are 100 percent, rounded to the nearest percent, for both energy and demand 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, 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.

Low-flow showerhead savings attribution. Data review realization rates were influenced by differing treatment of low-flow showerhead measures. Where multiple showerheads were installed in a home, the EM&V team awarded savings on a per-showerhead basis. However, in the ex-ante calculation savings appear to have been awarded per household. These changes resulted in a small increase in the realization rate.

Air infiltration eligibility requirements. TRM V1.0 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. In particular, for health and safety reasons, final ventilation levels are specified within the TRM, with savings not awarded for reducing leakage below these levels. In one home, post-treatment infiltration levels fell below the minimum final ventilation, with the ex-post savings calculated based on reduction to the minimum ventilation level, while ex-ante savings were reported as zero. The TRM also requires that contractors reduce air leakage by at least 10 percent through implementation of this measure. Nine projects reported positive ex-ante savings where infiltration levels remained within 10 percent of the initial leakage post-retrofit. The team did not assign ex-post savings for these projects. The net effect of the air infiltration adjustments was a small decrease 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 0.004 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 and demand savings 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 45 projects and resulted in desk review realization rates of 101 percent and 102 percent for energy and demand savings, respectively, rounded to the nearest percentage point. The EM&V team identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for four of the projects. The team noted the following transcription errors:



5. Impact Evaluation Results—Entergy Texas, Inc....

- For two projects, air infiltration inputs did not match between the provided documentation and the tracking database. In one case, this was due to differences in the recorded pre-retrofit air leakage; in the other, it was due to differences in the recorded post-retrofit air leakage. This resulted in a minor increase in the realization rate.
- In another project, the pre-treatment R-Value for ceiling insulation recorded in the tracking database did not reflect the value recorded in project documentation. This resulted in an increase in the realization rate.
- Lastly, the team noted a transcription error in the pre-treatment value for duct sealing for one project. This resulted in a minor increase in the realization rate.

C. Site visits

Site visits were conducted for 15 projects, resulting in site visit realization rates of 106 percent and 110 percent for energy and demand savings, respectively. All of the visited sites received desk reviews.

Through the site review process, the EM&V team identified differences in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is expected to be within ± 20 percent using a Duct Blaster test; for infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data values collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Discrepancies beyond ± 20 percent were noted for 7 of the 12 duct improvement projects. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 210 CFM₂₅; however, the M&V team observed leakages both higher and lower than those values reported. In one home, M&V staff found that the measured post-treatment leakage aligned with the pre-treatment leakage reported in the tracking system, and noted that the air registers could not be properly secured to the framing, limiting the potential for duct sealing to be performed successfully. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

Air infiltration improvements. Discrepancies beyond ± 10 percent were noted for 6 of the 11 homes that received a site visit after air sealing was performed. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 2,340 CFM₅₀; all of the M&V team observed leakages were lower than those values reported where a discrepancy greater than 10 percent was observed. The adjustments made based on on-site observations for this measure resulted in an increase in the site visit realization rate.



5. Impact Evaluation Results—Entergy Texas, Inc....

CFL installation. Discrepancies were also noted for the CFL measure installed for one project. The customer had replaced all CFLs installed through the program with higher-wattage incandescent lamp, reflecting lower persistence of measure savings. The adjustments made based on on-site observations for this measure resulted in a decrease in the site visit realization rate.

D. 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

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
8.0%	1,376	1,565	113.7%	11.8%	4,643,921	4,962,494	106.9%	Good

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

Evaluated savings for the Hard-to-Reach SOP were 1,565 kW and 4,962,494 kWh, with realization rates of 114 percent and 107 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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



5. Impact Evaluation Results—Entergy Texas, Inc....

review process. The evaluation team's desk-review- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

A. *Data review*

The data review realization rates are 100 percent for both energy and demand 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, 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.

Low-flow showerhead savings attribution. Data review realization rates were influenced by differing treatment of low-flow showerhead measures. Where multiple showerheads were installed in a home, the EM&V team awarded savings on a per-showerhead basis. However, in the ex-ante calculation savings appear to have been awarded per household. These changes resulted in a small increase in the realization rate.

Air infiltration eligibility requirements. TRM V1.0 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.¹¹ For homes where the initial leakage exceeds 4.0 CFM₅₀ per square foot, this cap is to be treated as the starting leakage. In one home, pre-treatment infiltration levels exceeded the leakage cap, with the ex-post savings calculated based on reduction relative to the cap while ex-ante savings were reported as 0.

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. Ten projects reported positive ex-ante savings where infiltration levels remained within 10 percent of the initial leakage or the initial cap post-retrofit. The team did not assign ex-post savings for these projects. The net effect of the air infiltration adjustments was a small decrease 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.

¹¹ 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.



5. Impact Evaluation Results—Entergy Texas, Inc....

B. Desk review

Desk reviews were completed for 17 projects, and resulted in desk review realization rates of 95 percent and 100 percent for energy and demand savings, respectively, rounded to the nearest percentage point. 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—for one project claiming duct sealing savings, the reported heating type recorded in the tracking database did not reflect that found in the project documentation. The change caused a decrease in the energy realization rate but did not have an impact on the demand realization rate.

C. Site visits

Site visits were conducted for four projects, resulting in site visit realization rates of 113 percent for both energy and demand savings. All of the visited sites received desk reviews.

Through the site review process, the EM&V team identified differences only in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is expected to be within ± 20 percent using a Duct Blaster test; for infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data values collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Discrepancies beyond ± 20 percent were noted for one of the two duct improvement projects, while the remaining home could not have duct leakage verified during the site visit due to the customer's schedule and was not included in the analysis. In the case where a discrepancy was noted, the team observed a difference in post-treatment leakage of 62 CFM₂₅. The adjustments made based on on-site observations for this measure resulted in a net increase in the site visit realization rate.

Air infiltration improvements. Discrepancies beyond ± 10 percent were noted for two of the three homes that received a site visit after air sealing was performed. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 490 CFM₅₀; all of the M&V team observed leakages were lower than those values reported where a discrepancy greater than 10 percent was observed. The adjustments made based on on-site observations for this measure resulted in a net increase in the site visit realization rate.

D. Documentation

Documentation was requested for a total of 17 sites through the supplemental data request. All 17 of these sites provided sufficient documentation for review. Since sufficient



5. Impact Evaluation Results—Entergy Texas, Inc....

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

5.3.3 Entergy Solutions High Performance Homes Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
11.4%	1,961	1,961	100.0%	7.4%	2,912,857	2,912,857	100.0%	Good

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.

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 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-built 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 PY2015, we suggest continuing discussions focused on demand savings calculations for new homes. Additionally, the EM&V team’s analysis of the



5. Impact Evaluation Results—Entergy Texas, Inc....

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.

5.3.4 Entergy Solutions High Performance Homes Market Transformation Program—Home Performance with ENERGY STAR®

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.5%	84	84	99.9%	0.5%	183,859	182,756	99.4%	Good

Completed Desk Reviews*	On-site M&V
5	3

*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.

Evaluated savings for Entergy’s Home Performance with ENERGY STAR® MTP were slightly different than claimed savings, with realization rates for kW being 99.9 percent and kWh being 99.4 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 the customer application and invoice, any calculators used, and reports of QA/QC or M&V activity if conducted. The EM&V team received for each project various QA/QC photos, measure savings document sheets, customer invoices, the savings calculator, and the duct efficiency calculator. As a result of the desk review phase, realization rates were adjusted slightly. These realization rate adjustments were mainly driven by savings modifications that resulted from data input refinements to infiltration and duct efficiency measures (made in three out of the five desk reviews).

Site visits were conducted for three projects, all of which received desk reviews. Site visit data generally supported the desk review findings.

Because sufficient supporting documentation for all sampled projects was received, the program documentation score is good.



5. Impact Evaluation Results—Entergy Texas, Inc....

5.4 DETAILED FINDINGS—LOAD MANAGEMENT

5.4.1 Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
35.1%	6,024	6,018	99.9%	0.0%	11,656	11,656	100.0%	Good

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 PY2014 evaluation activities found that the individual participant load impact calculations in the work papers were the same as those validated by using the individual customer interval load data. There were 32 reported program participants in 2014, and this is the number of participants for which the evaluation team received work papers and interval load data. There were three days (6/25, 6/27, and 8/29) in which events were called in the summer of 2014. All the events lasted for one hour.

Evaluated savings for the Entergy Load Management Standard Offer Program were 6,018 kW and 11,656 kWh. The realization rate for kW was 99.9 percent and the realization rate for kWh was 100 percent. This minor discrepancy in the kW was most likely due to rounding and was of no significance.



6. IMPACT EVALUATION RESULTS—ONCOR

This section presents the evaluated savings and cost-effectiveness results for Oncor’s energy efficiency portfolio. The key findings are summarized first, followed by details for each program in the portfolio.

6.1 KEY FINDINGS

6.1.1 Evaluated savings

Oncor’s evaluated savings for PY2014 are slightly higher than claimed savings, with 127,141 for demand (kW) and 206,057,501 for energy (kWh) savings. The overall kW portfolio realization rate is 101.5 percent, and the overall kWh portfolio realization rate is 102.0 percent. Commercial savings adjustments were primarily made for baselines, savings calculators and TRM discrepancies, and lighting fixture counts. On-site findings regarding duct and air infiltration improvements and ceiling insulation as well as heating system types accounts for some of the difference between residential evaluated and claimed savings.

Table 6-1 shows the claimed and evaluated demand savings for Oncor’s portfolio and broad customer sector/program categories for PY2014.

Table 6-1. Oncor Program Year 2014 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kw)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kw)	Precision at 90% Confidence
Total Portfolio		125,275	127,141	101.5%	2.0%
Commercial Sector	16.7%	20,865	21,027	100.8%	9.2%
Residential Sector	36.1%	45,165	46,869	103.8%	3.5%
Load Management	47.3%	59,245	59,245	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 6-2 shows the claimed and evaluated energy savings for Oncor’s portfolio and broad customer sector/program categories for PY2014.



6. Impact Evaluation Results—Oncor...

Table 6-2. Oncor Program Year 2014 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		202,105,135	206,057,501	102.0%	9.4%
Commercial Sector	43.5%	87,914,456	89,477,307	101.8%	21.2%
Residential Sector	56.4%	114,000,136	116,389,651	102.1%	3.6%
Load Management	0.1%	190,543	190,543	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. Program-level results should only be used to provide insight into how individual programs are affecting the overall portfolio realization rates.**

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 PY2014. As program documentation recommendations from the PY2012 EM&V effort are to come into effect in PY2014, the EM&V team did expect program documentation scores to improve between PY2012 and PY2014.

6.1.2 Cost-effectiveness results

Oncor’s overall portfolio had a cost-effectiveness of 2.03, or 2.25 excluding low-income 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.



6. Impact Evaluation Results—Oncor...

Table 6-3. Oncor Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	1.99	2.03	1.73
Total Portfolio excluding low-income programs	2.20	2.25	1.91
Commercial Sector	2.13	2.16	1.86
Commercial SOP (Custom)	3.67	3.60	2.89
Commercial SOP (Basic)	3.61	3.75	3.02
Solar PV SOP (COM)	1.08	1.08	1.09
Small Business Direct Install MTP	1.11	1.11	1.00
Residential Sector	2.33	2.39	2.00
Home Energy Efficiency SOP	3.14	3.32	2.59
Solar PV SOP (RES)	1.10	1.14	1.09
AC Distributor	2.10	2.10	1.76
Hard-to-Reach SOP	1.66	1.53	1.53
Low-Income	1.05	1.01	1.01
Targeted Weatherization Low Income SOP	1.05	1.01	1.01
Load Management	1.40	1.40	1.40
Commercial Load Management SOP	1.40	1.40	1.40

6.2 DETAILED FINDINGS—COMMERCIAL

6.2.1 Commercial standard offer

A. Commercial Standard Offer Program (Basic)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
7.3%	9,114	9,361	102.7%	23.7%	47,855,098	49,865,012	104.2%	Good

Completed Desk Reviews*	On-site M&V
38	34

*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.



6. Impact Evaluation Results—Oncor...

The evaluated energy and demand savings for the Oncor Basic Commercial SOP were slightly higher than the claimed savings, with realization rates of 104 percent and 103 percent, respectively.

The project specific savings adjustments that were the major drivers of the program level realization rate are listed below by Project ID:

Project ID #708588: The EM&V team found an error in the baseline fixture wattages for this lighting upgrade project. The ex-ante calculations listed all baseline fixtures as 50W halogens; however, the on-site visit verified that these were actually 60W halogens. This discrepancy resulted in an increase in the project savings estimates. The realization rate for both energy and demand is 129 percent.

Project ID #711093: During the on-site visit, the EM&V team found different usage area types and fixture quantities than were reported in the ex-ante documentation. The outdoor area type for the lighting measures was reported to be “Outdoor Zone 3;” however, the on-site verification found it to be “Outdoor Zone 2,” which allots 0.06 W/sq. ft. as opposed to 0.10 W/sq. ft. for Zone 3. The lower lighting power density (LPD) decreased the baseline wattage for the outdoor fixtures, which subsequently decreased the overall savings. In addition, the EM&V team found an additional wallpack fixture during the on-site visit. These updates resulted in an 84 percent realization rate for energy savings and 89 percent realization rate for demand savings for the on-site verification.

Project ID #713343: During the on-site visit, the EM&V team found an error in the calculation methodology for this lighting project. The ex-ante calculation methodology states that Oncor adjusts the baseline fixture counts if more than 10 percent of the pre-retrofit fixtures are non-operational. The on-site inspection verified that only 4 percent of pre-retrofit fixtures were non-operational, so the EM&V team removed the adjustment from the savings calculator. The resulting evaluated on-site energy and demand realization rate for this project is 109 percent.

There were eight additional lighting projects where the EM&V team found different fixture and sensor counts than those listed in the ex-ante documentation. Table 6-4 below provides an overview of these changes and the associated reasons for discrepancy.

Table 6-4. Reasons for Discrepancy for Lighting Projects with Different Fixture Counts

Participant ID	On-site Visit Conducted (Y/N)	Realization Rate (kWh)	Realization Rate (kW)	Reason for Discrepancy
703495	Y	61%	61%	The on-site verification for this lighting upgrade project revealed that the post-retrofit fixture count was actually lower than reported. Both baseline and as-installed-fixture counts were adjusted downward.



6. Impact Evaluation Results—Oncor...

Participant ID	On-site Visit Conducted (Y/N)	Realization Rate (kWh)	Realization Rate (kW)	Reason for Discrepancy
705356	Y	106%	107%	The on-site verification found that there were fewer lighting fixtures installed than were recorded in the ex-ante calculations. This resulted in a lower post kW, which increased the overall savings for this site.
706837	Y	79%	79%	The EM&V team verified that there were fewer fixtures installed on-site than were reported. The ex-ante calculator reported that 176 fixtures had been retrofit, but only 139 fixtures were found to be installed. The calculations were adjusted accordingly.
707429	Y	97%	97%	The on-site verification found additional lighting fixtures on-site that were not included in the ex-ante savings, so savings were adjusted accordingly, resulting in a lower realization rate.
707922	Y	101%	118%	The EM&V team found that there was one additional fixture installed on-site, which caused the overall savings to increase slightly.
708474	Y	62%	62%	For this lighting updates project, the EM&V team determined that there was an error in the ex-ante calculator. The lighting calculation tool did not account for the post-installation fixture energy consumption. In addition, the EM&V team found two fewer fixtures installed during the on-site visit. The savings estimates were recalculated accordingly.
709016	Y	115%	112%	The on-site visit verified that there were seven less fixtures installed than were originally reported, and that all linear fluorescent fixtures had integrated occupancy sensors. Adjustments for these discrepancies resulted in higher realization rates.
718862	Y	118%	115%	For this project, the ex-ante calculations showed that about half of the post-installation fixtures had occupancy sensors installed. The on-site inspection found that <u>all</u> incentivized fixtures had new occupancy sensors, which resulted in higher than claimed savings.



6. Impact Evaluation Results—Oncor...

The EM&V team assigned a program documentation score of good for the PY2014 Oncor Basic Commercial SOP projects as sufficient documentation was received for 95% of projects.

B. Commercial Standard Offer Program (Custom)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
3.0%	3,701	3,666	99.1%	11.0%	22,321,309	21,810,151	97.7%	Good

Completed Desk Reviews*	On-site M&V
13	6

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

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 evaluated energy and demand savings for the Oncor Custom Commercial SOP were slightly lower than the claimed savings, with realization rates of 98 percent for energy and 99 percent for demand, respectively.

The EM&V team made minor project specific savings adjustments to two projects, which affected the program level realization rates. The adjustments were discussed with Oncor and were primarily a result of projects “rolling over” from the prior calendar year (2013) and therefore not being based on TRM V1.0 that was to be used for PY2014 claimed savings. Oncor reports that this issue has been resolved, and going forward, claimed savings will be calculated based on the TRM when the project is completed as opposed to when it began. Adjustments are listed below by Project ID:

Project ID #703275: During the on-site M&V visit, the EM&V team determined that the ex-ante calculations referenced incorrect demand and HVAC coefficients. The EM&V team also noticed that additional energy consumption for the water-cooled chiller auxiliary equipment was not included in the energy calculations, as noted in the TRM. The EM&V team updated the kW/ton ratings due to the nature of the chiller retrofit and fixed the reference errors in addition to re-calculating the savings estimates to account for the auxiliary equipment. Adjusting for these discrepancies resulted in an energy realization rate of 38 percent and a demand realization rate of 98 percent.

Project ID #706695: After review of the Oncor Calculator, the EM&V team determined that the calculator incorrectly listed the demand coefficients for “Small Office” as 0.92, for water-cooled chillers. The Oncor calculator uses the “Small Office” coefficients for “Medium Office.” Based on PUCT Docket 30331, Table 4.1, the demand coefficients for “Small Office” are listed as 0.8. There is no “Medium Office” building type listed for



6. Impact Evaluation Results—Oncor...

chillers within the docket. Updating the demand coefficients resulted in a demand savings realization rate of 87 percent. This change did not affect the project energy savings.

The EM&V team assigned a documentation score of good for the Oncor Custom Commercial SOP projects in PY2014 as approximately 92 percent of the projects reviewed had sufficient documentation.

C. Commercial Solar PV Installation Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
5.5%	6,932	6,884	99.3%	6.3%	12,818,936	12,883,031	100.5%	Good

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 the Commercial Solar PV Installation SOP were 6,990 kW demand and 13,612,870 kWh energy, with realization rates of 99.3 percent for demand and 100.5 percent for energy.

The realization rates were driven by adjustments to claimed energy and peak savings made at two projects based on desk reviews. Details on the two adjustments are provided below:

Project ID #14SPVCOM - 2014 - 29393_261340: Demand kW Realization Rate = 94 percent, Energy kWh Realization Rate = 100 percent. The EM&V team was able to verify the installed system capacity ratings for this site based on inspection reports. The system tilt, azimuth, and location match the entries for the ex-ante PVWatts simulations, so demand and annual savings essentially match for realization rate nearly equals one. The demand savings realization rate is slightly different than 1 because the evaluated demand savings are based on the peak hourly generation and the claimed demand savings are based on AC capacity.

Project ID #14SPVCOM - 2014 - 33068_322011: Demand kW Realization Rate = 102 percent, Energy kWh Realization Rate = 110 percent. The EM&V team was able to verify the installed system capacity for this site based on inspection reports. Two of the three arrays used the PVWatts method but used the city of Austin for weather. The system ZIP code is located in Dallas, so the evaluated savings used the TMY2 weather from Fort Worth, resulting in slightly higher than expected savings given that Fort Worth receives slightly more sunlight than Austin in a typical year. The azimuths of the



6. Impact Evaluation Results—Oncor...

inspected arrays were also slightly different than those that were initially applied for. Finally, the demand savings realization rate is slightly different than 1 because the evaluated demand savings are based on the peak hourly generation and the claimed demand savings are based on AC capacity.

The EM&V team was able to verify 100 percent of the inputs to the approved calculators (deemed savings or PVWatts) in our review of a sample of inspection reports, so the overall program documentation score is good.

i. Findings and recommendations

The EM&V team made a number of recommendations in the PY2013 report to improve savings calculations for sites that use the PVWatts method presented in TRM petition 40885. It is the EM&V team’s understanding that Oncor has implemented these changes for PY2015 but could not make these changes in PY2014. Therefore, these recommendations are not repeated in this report.

6.2.2 Commercial market transformation

A. Small Business Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.9%	1,118	1,117	99.9%	2.4%	4,919,113	4,919,113	100.0%	Good

Completed Desk Reviews*	On-site M&V
11	3

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

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 Open MTP resulted in realization rates of almost 100 percent for kW and 100 percent for kWh. For this program the PY2014 evaluation efforts focused on desk reviews and on-site M&V. The realization rates were affected by savings adjustments made from desk review results for one project as further described below.

Project ID #717193: The EM&V team found lighting fixture quantities varied significantly from reported to the on-site M&V survey. The business that originally installed the new LED lighting retrofits has since moved locations and the new business made significant layout changes to the occupied space. Only 4 of the 37 new LEDs remain in operation as identified during the onsite survey, resulting in a significant reduction to project savings. The project updates resulted in decreased savings (kWh and kW realization rates equal to 18 percent).



6. Impact Evaluation Results—Oncor...

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for ten of the ten 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 for these estimates is good.

6.3 DETAILED FINDINGS—RESIDENTIAL

6.3.1 Residential standard offer

A. Home Energy Efficiency Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
24.6%	30,790	32,739	106.3%	40.5%	81,868,628	86,232,226	105.3%	Good

Completed Desk Reviews*	On-site M&V
95	40

*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 Oncor RSOP were 32,739 kW and 86,232,226 kWh, with realization rates of 106 percent and 105 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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



6. Impact Evaluation Results—Oncor...

i. Data review

The data review realization rates are 103 percent for both energy and demand 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.

a. Utility claimed savings modifications

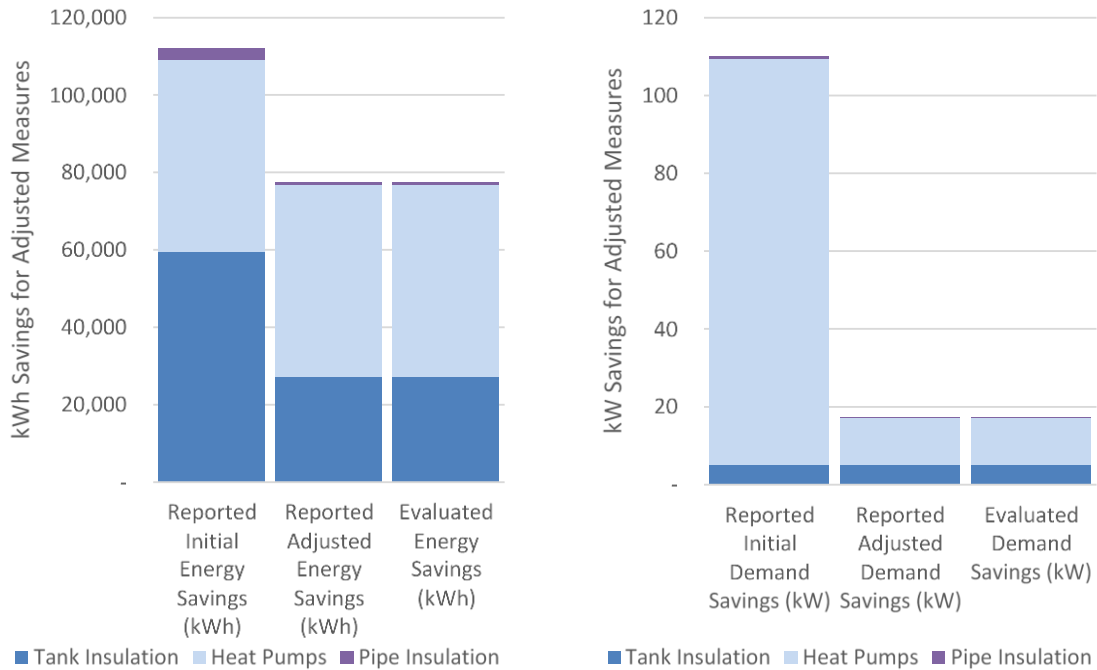
These realization rates reflect a comparison between the EM&V team's evaluated savings and adjusted savings provided to the team by Oncor following discussion of notable systematic differences in savings calculations for several measures. These updates resulted in a decrease in claimed savings of 34,708 kWh and 93 kW across three measures—tank insulation, pipe insulation, and heat pumps. The team identified the following differences in savings calculation methodology:

- *Tank insulation.* The EM&V team was able to recreate Oncor's initial energy savings values when the volume, rather than the surface area, of the retrofit water tank was used in the energy savings calculation. Oncor revised its savings values to align with the EM&V team's calculations.
- *Pipe insulation.* The EM&V team was able to recreate Oncor's initial energy and demand savings values when a prescribed pipe thickness value was not incorporated into the savings calculation, and when the overall savings were multiplied by the default pipe length provided by Oncor (note: pipe length is factored into surface area, which appears in the savings calculation). Oncor revised its savings values to align with the EM&V team's calculations.
- *Heat pumps.* In the 2014 program year, the heating equipment type being replaced in each heat pump installation was not tracked. Oncor initially calculated savings using a heat pump baseline for energy savings, but an electric resistance furnace as the baseline equipment for calculating demand savings. In order to award savings conservatively, Oncor revised its savings to assume a heat pump baseline for all savings calculations.

Figure 6-1 depicts the impact of the adjustments made by Oncor to align with the EM&V team's evaluated savings.

6. Impact Evaluation Results—Oncor...

Figure 6-1. Oncor RSOP Comparison of Initial, Adjusted, and Evaluated Savings



b. Claimed savings data review

In comparison against Oncor’s adjusted savings, the data review realization rate is close to 100 percent, indicating that the program tracking data is very 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 utilities’ QC-adjusted savings values resulted in a small impact on the realization rates for air infiltration, ceiling insulation, ENERGY STAR® windows, and duct sealing measures.

Duct sealing. In its review of the reported duct sealing measures, the team noted five instances where the reported ex-ante savings represented savings calculated for gas heating equipment, although the data tracking system indicated that these projects took place in homes served by either electric resistance furnaces or heat pumps. Furthermore, while the TRM places a “ceiling” on pre-retrofit leakage equal to 35 percent of fan flow, with fan flow assumed to be 400 x AC tonnage, these projects appeared to calculate savings relative to the initial leakage rather than relative to this cap. The overall effect of these differences was an increase in the realization rate.



6. Impact Evaluation Results—Oncor...

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.

Minor calculation differences. The team observed additional divergences in energy and demand savings for air infiltration, ceiling insulation, ENERGY STAR® windows, central ACs, and duct sealing measures that may stem from data input or calculation errors. In many of these cases, the ex-ante savings were reported as 0, though not as a result of the provided adjustment factors. The impact of this discrepancy is small, however, and does not appear to indicate any systematic error. The overall effect was an increase in the realization rate.

ii. Desk review

Desk reviews were completed for 95 projects, and resulted in desk review realization rates of 100 percent for both energy and demand savings. The EM&V team identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for four of the projects:

- For two ceiling insulation projects, the team noted that the area recorded in the tracking database did not reflect the value found in project documentation. Both instances found increases in installed square footage and resulted a minor increase in the realization rate.
- For two air infiltration reduction measures, the team noted transcription errors in the post-retrofit air leakage. Both instances found decreases in post CFM values and resulted in a minor increase in the realization rate.

iii. Site visits

Site visits were conducted for 40 projects, resulting in site visit realization rates of 102 percent and 103 percent for energy and demand savings, respectively. All of the visited sites received desk reviews.

Through the site review process, the EM&V team identified differences in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is expected to be within ± 20 percent using a Duct Blaster test; for infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data values collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Discrepancies beyond ± 20 percent were noted for 8 of the 12 duct improvement projects. At a further two homes, the M&V team could not verify duct leakage due to customer opt-out or challenges in pressurizing the home and/or ductwork. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of



6. Impact Evaluation Results—Oncor...

up to 118 CFM₂₅; however, the M&V team observed leakages both higher and lower than those values reported. In one of the homes with the highest difference between the leakage observed by the M&V staff and that reported in the data tracking system, the customer did not recall the original contractor using a duct fan, indicating that the Duct Blaster test may not have been used to derive the reported leakage values. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

Air infiltration improvements. Discrepancies beyond ± 10 percent were noted for 18 of the 34 homes that received a site visit after air sealing was performed. For four additional projects, the M&V team could not verify the air leakage due to issues related to testing procedures (e.g., calibration/pressurization). In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 1,422 CFM₅₀; however, the M&V team observed leakages both higher and lower than those values reported. At one of these sites, the team verified that an electric resistance furnace was installed rather than a heat pump as indicated in the tracking data. The adjustments made based on on-site observations for this measure resulted in a net increase in the site visit realization rate.

Ceiling insulation. Two sites that received ceiling insulation showed discrepancies between the observed and reported measure inputs in the initial, pre-retrofit R-value of the ceiling insulation, in the heating equipment type serving the home, and/or in the square footage of the treated area. At one of these sites, which spanned three areas, the team verified that an electric resistance furnace was installed rather than a heat pump as indicated in the tracking data. At the same site, they found differing levels of pre-treatment insulation than indicated in the tracking data. At the remaining site, a small difference in treated area (within 4 percent) was observed by the M&V team. Overall, the adjustments made based on on-site observations for this measure resulted in a large net increase in the site visit realization rate.

iv. Documentation

Documentation was requested for a total of 95 sites through the supplemental data request. Of these sites, documentation was provided for 95, all of which 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.

B. Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
6.4%	7,977	7,709	96.7%	10.1%	20,450,231	18,170,031	88.8%	Good



6. Impact Evaluation Results—Oncor...

Completed Desk Reviews*	On-site M&V
41	20

*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 Oncor Hard-to-Reach SOP were 7,709 kW and 18,170,031 kWh, with realization rates of 97 percent and 89 percent for both demand and energy.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

i. Data review

The data review realization rates are 103 percent for both energy and demand 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.

a. Utility claimed savings modifications

These realization rates reflect a comparison between the EM&V team's evaluated savings and adjusted savings provided to the team by Oncor following discussion of notable systematic differences in savings calculations for several measures. These updates resulted in a decrease in claimed savings of 9,269 kWh across two measures, tank insulation and pipe insulation. The team identified the following differences in savings calculation methodology:

- *Tank insulation.* The EM&V team was able to recreate Oncor's initial energy savings values when the volume, rather than the surface area, of the retrofit water tank was used in the energy savings calculation. Oncor revised its savings values to align with the EM&V team's calculations.

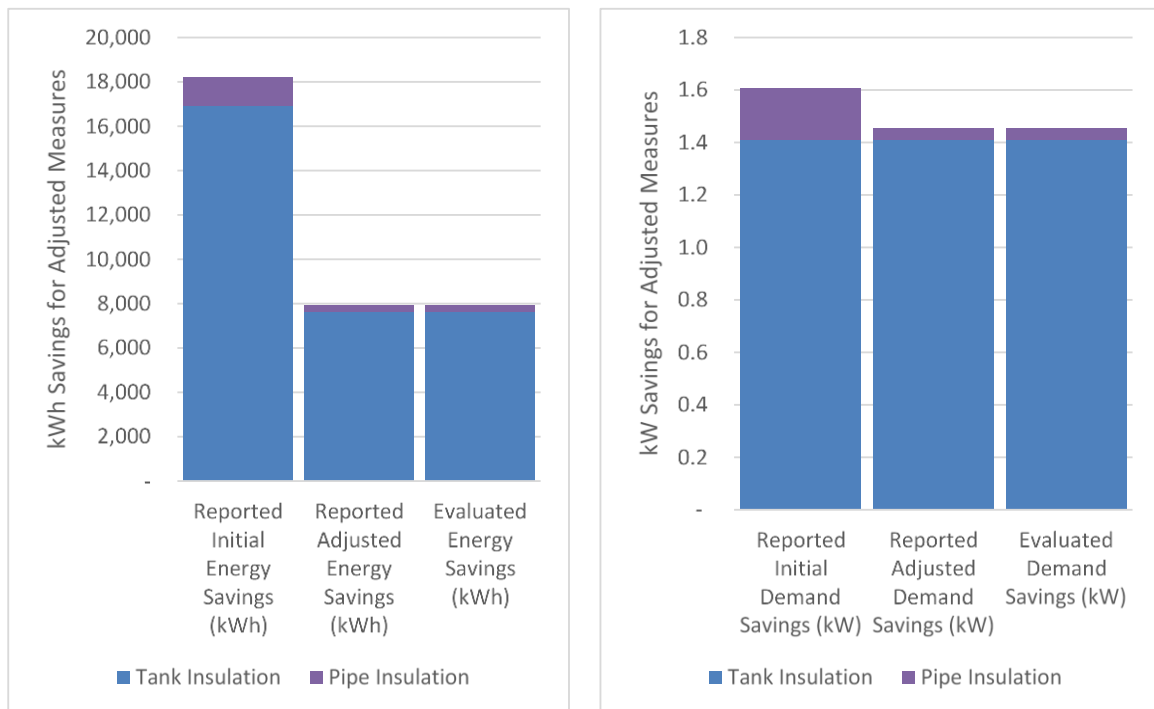


6. Impact Evaluation Results—Oncor...

- **Pipe insulation.** The EM&V team was able to recreate Oncor’s initial energy and demand savings values when a prescribed pipe thickness value was not incorporated into the savings calculation, and when the overall savings were multiplied by the default pipe length provided by Oncor (note: pipe length is factored into surface area, which appears in the savings calculation). Oncor revised its savings values to align with the EM&V team’s calculations.

Figure 6-2 depicts the impact of the adjustments made by Oncor to align with the EM&V team’s evaluated savings.

Figure 6-2. Oncor HTR SOP Comparison of Initial, Adjusted, and Evaluated Savings



b. Claimed savings data review

In comparison against Oncor’s adjusted savings, the data review realization rate is close to 100 percent, indicating that the program tracking data is very 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 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, ceiling insulation, and duct sealing measures.



6. Impact Evaluation Results—Oncor...

CFL baseline update. The team identified discrepancies in seven of the CFL projects undertaken through the Oncor Hard-to-Reach Standard Offer Program. For these projects, savings were calculated using savings tables provided for use in 2013. These tables do not reflect more stringent lighting baselines effective January 1, 2014, under the Energy Independence and Security Act of 2007 (EISA). The overall effect was a decrease in the realization rate.

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.

Minor calculation differences. The team observed additional divergences in energy and demand savings for air infiltration, ceiling insulation, and duct sealing measures that may stem from data input or calculation errors. In many of these cases, the ex-ante savings were reported as 0, though not as a result of the provided adjustment factors. The impact of this discrepancy is small, however, and does not appear to indicate any systematic error. The overall effect was an increase in the realization rate.

ii. Desk review

Desk reviews were completed for 41 projects, and resulted in desk review realization rates of 99 percent and 100 percent for energy and demand savings, respectively, rounded to the nearest percentage point. The EM&V team identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for four of the projects. The team noted the following transcription errors:

- An error in the heating type for one home that affected two measures, duct sealing and air infiltration reduction. The duct measure affected by this heating type error also had a discrepancy in the cooling tonnage. These issues resulted in a minor decrease in the realization rate.
- For one home that installed ceiling insulation, the area recorded in the tracking database did not reflect the value found in project documentation. This instance found an increase in installed square footage and resulted in a minor increase in the realization rate.
- Lastly, for one air infiltration reduction measure, the team noted a transcription error in the post-retrofit leakage. This adjustment resulted in a minor decrease in the realization rate.

iii. Site visits

Site visits were conducted for 20 projects, resulting in site visit realization rates of 87 percent and 95 percent for energy and demand savings, respectively. All of the visited sites received desk reviews.

Through the site review process, the EM&V team identified differences in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is expected to be within \pm



6. Impact Evaluation Results—Oncor...

20 percent using a Duct Blaster test; for infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data values collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Discrepancies beyond ± 20 percent were noted for five of the six duct improvement projects. At the remaining home, the M&V team could not verify duct leakage because the ducts could not achieve a neutral pressure relative to the house. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 370 CFM₂₅; however, the M&V team observed leakages both higher and lower than those values reported. In the two homes with the highest difference between the leakage observed by the M&V staff and that reported in the data tracking system, the customer stated that the original contractor had not used a duct fan, and did not recall anything being taped, indicating that the Duct Blaster test may not have been used to derive the reported leakage values. At a third site, the M&V staff was unable to seal two diffusers and therefore used the leakage-to-outside method. Overall, the adjustments made based on on-site observations for this measure resulted in a large net decrease in the site visit realization rate.

Air infiltration improvements. Discrepancies beyond ± 10 percent were noted for 7 of the 12 homes that received a site visit after air sealing was performed. For three additional projects, the M&V team could not verify the air leakage due to issues related ongoing home renovations or to post-installation CFM testing procedures (e.g., calibration/pressurization). In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 2,058 CFM₅₀; however, the M&V team observed leakages both higher and lower than those values reported. The adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

Ceiling insulation. One sites that received ceiling insulation showed a discrepancy between the observed and reported square footage of the treated area, with the M&V team noting approximately 11 percent greater insulated area. Overall, the adjustments made based on on-site observations for this measure resulted in a net increase in the site visit realization rate.

iv. Documentation

Documentation was requested for a total of 41 sites through the supplemental data request. Of these sites, documentation was provided for 41, all of which 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.



6. Impact Evaluation Results—Oncor...

C. Residential Solar PV Installation Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
3.4%	4,227	4,261	100.8%	3.7%	7,494,188	7,958,827	106.2%	Good

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 small sample sizes.

Evaluated savings for the Residential Solar PV Installation SOP were 4,196 kW demand and 7,531,748 kWh energy, with realization rates of 100.8 percent for demand and 106.2 percent for energy.

The realization rates were driven by adjustments to claimed energy and peak savings made at four projects based on desk reviews. Details on the four adjustments are provided below.

Project ID #14SPVRES - 2014 - 28241_261229: Demand kW Realization Rate = 103 percent, Energy kWh Realization Rate = 100 percent. The EM&V team was able to verify the installed system capacity ratings for this site based on inspection reports. The location matches the ex-ante PVWatts simulations but the inspected tilt and azimuth varied slightly from the initial PVWatts simulations. Additionally, the demand savings realization rate is slightly different than 1 because the evaluated demand savings are based on the peak hourly generation and the claimed demand savings are based on AC capacity.

Project ID #14SPVRES - 2014 - 28538_267602: Demand kW Realization Rate = 99 percent, Energy kWh Realization Rate = 100 percent. The EM&V team was able to verify the installed system capacity ratings for this site based on inspection reports. The location matches the ex-ante PVWatts simulations but the inspected tilt and azimuth varied slightly from the initial PVWatts simulations. Additionally, the ex-ante savings for this site used PVWatts V5 so are slightly different than the evaluated savings that use PVWatts V1 as per the TRM.

Project ID #14SPVRES - 2014 - 31351_324170: Demand kW Realization Rate = 98 percent, Energy kWh Realization Rate = 102 percent. The EM&V team was able to verify the installed system capacity ratings for this site based on inspection reports. The location matches the ex-ante PVWatts simulations but the inspected tilt and azimuth varied slightly from the initial PVWatts simulations. Additionally, the demand savings realization rate is slightly different than 1 because the evaluated demand savings are based on the peak hourly generation and the claimed demand savings are based on AC capacity.



6. Impact Evaluation Results—Oncor...

Project ID #14SPVRES - 2014 - 28538_267602: Demand kW Realization Rate = 99 percent, Energy kWh Realization Rate = 98 percent. The EM&V team was able to verify the installed system capacity ratings for this site based on inspection reports. The location matches the ex-ante PVWatts simulations but the inspected tilt and azimuth varied slightly from the initial PVWatts simulations. Additionally, the ex-ante savings for this site used PVWatts V5 so are slightly different than the evaluated savings that use PVWatts V1 as per the TRM.

The EM&V team was able to verify 100 percent of the inputs to the approved calculators (deemed savings or PVWatts) in our review of a sample of inspection reports, so the overall program documentation score is good.

i. Findings and recommendations

The EM&V team made a number of recommendations in the PY2013 report to improve savings calculations for sites that use the PVWatts method presented in TRM petition 40885. It is the EM&V team’s understanding that Oncor has implemented these changes for PY2015 but could not make said changes in PY2014. Therefore, these recommendations are not repeated in this report.

D. Targeted Weatherization Low Income Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
1.7%	2,075	2,063	99.4%	1.9%	3,885,334	3,726,813	95.9%	Good

Completed Desk Reviews*	On-site M&V
21	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.

Evaluated savings for the Oncor Targeted Weatherization Low Income SOP were 2,063 kW and 3,726,813 kWh, with realization rates of 99 percent and 96 percent for demand and energy, respectively.

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

- Data review, to check that tracking system data are aligned with deemed savings in the technical reference manual



6. Impact Evaluation Results—Oncor...

- Desk review, to check that measure data collected by contractors on forms aligns correctly with that in the tracking system
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

i. Data review

The data review realization rates are 100 percent for both energy and demand savings, rounded to the nearest percent. 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.

a. Utility claimed savings modifications

These realization rates reflect a comparison between the EM&V team's evaluated savings and adjusted savings provided to the team by Oncor following discussion of notable systematic differences in savings calculations for several measures. These updates resulted in an increase in claimed energy savings of 1,595,724 kWh and a decrease in claimed demand savings of 56 kW across five measures—tank insulation, pipe insulation, and heat pumps. The team identified the following differences in savings calculation methodology:

- *Low-flow showerheads.* The EM&V team noted that low-flow showerhead installations were initially awarded fixed savings of 92.7 kWh and 0.0313 kW per project, independent of flow rate or other savings calculation inputs. Furthermore, savings were awarded for a project where the flow-rate exceeded eligibility limits. Oncor revised its savings values to align with the EM&V team's calculations.
- *Water heater replacements.* The team determined that the initial ex-ante savings values were developed through application of deemed savings from petition 27903 for installations of water heater replacements measures. These deemed savings values have been superseded by petition 41722, which is the basis for water heater savings in TRM V1.0.
- *Tank insulation.* The EM&V team was able to recreate Oncor's initial energy savings values when the volume, rather than the surface area, of the retrofit water tank was used in the energy savings calculation. Oncor revised its savings values to align with the EM&V team's calculations.
- *Pipe insulation.* The EM&V team was able to recreate Oncor's initial energy and demand savings values when a prescribed pipe thickness value was not incorporated into the savings calculation, and when the overall savings were multiplied by the default pipe length provided by Oncor (note: pipe length is factored



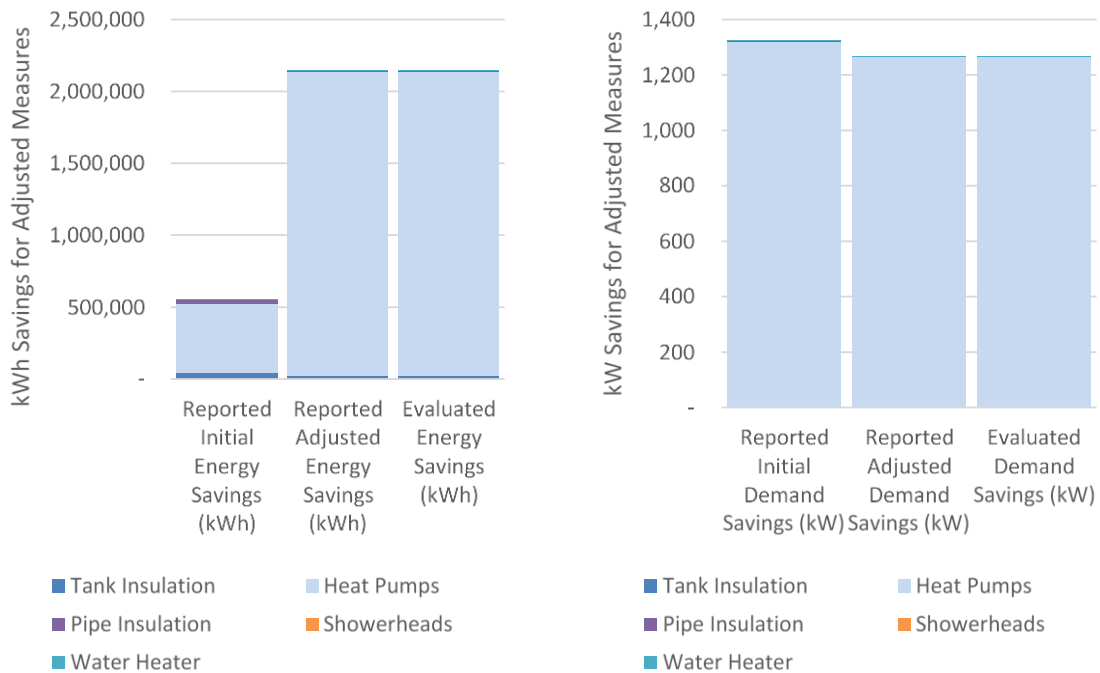
6. Impact Evaluation Results—Oncor...

into surface area, which appears in the savings calculation). Oncor revised its savings values to align with the EM&V team’s calculations.

- *Heat pumps.* Although not available for RSOP and HTR SOP programs, the heating equipment type being replaced in each heat pump installation was tracked for Oncor’s low-income program. However, energy savings for these measures were often understated. Heat pump measures that replaced electric resistance units appeared to calculate energy savings with a heat pump baseline, but nevertheless awarded heating-side demand savings for replacement of an electric resistance furnace. Conversely, heat pump-to-heat pump replacements appear to award demand savings for replacement of an electric resistance furnace. As no winter demand savings specific to this replacement type are available in TRM V1.0, the summer demand savings for this measure should be awarded. Through conversations with Oncor, the team also found that one measure initially reported as a heat pump should have been recategorized as a central AC replacement.

Figure 6-3 depicts the impact of the adjustments made by Oncor to align with the EM&V team’s evaluated savings.

Figure 6-3. Oncor Targeted Weatherization Low Income Program Comparison of Initial, Adjusted, and Evaluated Savings



b. Claimed savings data review

In comparison against Oncor’s adjusted savings, the data review realization rate is 100 percent, rounded to the nearest percentage point, indicating that the program tracking data is



6. Impact Evaluation Results—Oncor...

very consistent with the values in the TRM. The difference reflected in the data review realization rate is driven by several factors.

Floor insulation installed in manufactured homes. In reviewing the floor insulation measure, the team determined that, for several projects, the savings reported were calculated for an installation in a mobile home. However, tracking data for floor insulation measures do not indicate the home type where the measure was installed. For consistency, the team therefore calculated all ex-post savings using savings values for site-built homes. The overall effect was an increase in the realization rate.

Miscategorized central AC installation. As noted above, for one project a central AC was initially miscategorized as a heat pump installation. The team re-calculated savings for this project using deemed savings for a central AC installation.

Refrigerator savings reported for multifamily homes. The team observed 32 projects in which refrigerators were awarded savings for an installation in a multi-family complex while the tracking system described these sites as single-family. 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. All identified variations due to rounding were within 1 kWh and 0.001 kW.

Minor calculation differences. The team observed an additional divergence in energy and demand savings for a window AC measure. For this measure, the ex-ante savings were reported as 0, though not as a result of the provided adjustment factors. The impact of this discrepancy is small, however, and does not appear to indicate any systematic error. The overall effect was an increase in the realization rate.

ii. Desk review

Desk reviews were completed for 21 projects, and resulted in desk review realization rates of 97 percent and 101 percent for energy and demand 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 nine of the projects. The team noted the following transcription errors:

- Seven infiltration projects did not match between the provided documentation and the tracking database. In all cases, this was due to differences in the recorded pre-retrofit air leakage; in two of the cases, it was also due to difference in the recorded post-retrofit air leakage. For three air infiltration reduction projects, the team could not verify critical inputs due to missing information on the program documentation for post-retrofit air leakage and heating type. Overall, these instances increased the realization rate.
- For one floor insulation project, the team noted a transcription error in the heating type, resulting in a decrease in realization rate.
- Lastly, the team noted a small transcription error in the area for one solar screens project, resulting in an increase in the realization rate.



6. Impact Evaluation Results—Oncor...

iii. Site visits

Site visits were conducted for five projects, resulting in site visit realization rates of 99 percent for both energy and demand savings. All of the visited sites received desk reviews.

For one project, M&V field staff measured the square footage of installed ENERGY STAR® window area to be 30 percent lower than that recorded in the data tracking system for this customer. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

iv. Documentation

Documentation was requested for a total of 21 sites through the supplemental data request. Of these sites, documentation was provided for 21, all of which 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.

6.3.2 Residential market transformation

A. Air Conditioning Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
0.1%	97	97	100.0%	0.1%	301,754	301,754	100.0%	NA

This program was not offered in PY2014. Demand and energy savings recorded in 2014 but attributable to PY2013 participants are shown in the above table.

6.4 DETAILED FINDINGS—LOAD MANAGEMENT

6.4.1 Commercial Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
47.3%	59,245	59,245	100.0%	0.1%	190,543	190,543	100.0%	Good

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.



6. Impact Evaluation Results—Oncor...

The PY2014 evaluation activities found that the individual participant load impact calculations in the work papers supplied to the EM&V Team were the same as those validated by using the individual customer interval load data. There were 178 reported program participants participating in 2014 and the evaluation team was able to verify savings for all 178 participants. There was one scheduled event called on May 22, 2014, and it lasted for three hours.

Evaluated savings for the Oncor Load Management Standard Offer Program were 59,245 kW and 190,543 kWh. The realization rate for kW was 100 percent and the realization rate for kWh was also 100 percent.



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.

7.1 KEY FINDINGS

7.1.1 Evaluated savings

Sharyland’s evaluated savings for PY2014 were 318 for demand (kW) and 1,096,334 for energy (kWh) savings. The overall kW portfolio realization rate is 84 percent and the kWh portfolio realization rate is 61 percent due to residential savings adjustments from the on-site M&V. The main driver of the lower evaluated savings is the RSOP on-site M&V that found differences in post-treatment leakage for 19 of the 24 duct improvement projects evaluated. All of these duct improvement projects were associated with work performed by a single energy efficiency service provider at a large multi-family project. In addition, the Targeted Low-Income Program had lower savings primarily due to adjustments for one project that could not be verified through on-site M&V to have electric space heating, which was reported in the claimed savings. These findings were discussed with Sharyland and strategies agreed to that should address the identified issues being repeated in future program years.

Table 7-1. Sharyland Program Year 2014 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kw)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kw)*	Precision at 90% Confidence
Total Portfolio		379	318	84.0%	9.5%
Commercial Sector	2.2%	8	8	100.0%	0.0%
Residential Sector	97.8%	371	310	83.6%	9.8%

*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 PY2014.



Table 7-2. Sharyland Program Year 2014 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)*	Precision at 90% Confidence
Total Portfolio		1,790,776	1,096,334	61.2%	9.9%
Commercial Sector	1.5%	27,545	27,545	100.0%	0.0%
Residential Sector	98.5%	1,763,231	1,068,789	60.6%	10.2%

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

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. Program-level results should only be used to provide insight into how individual programs are affecting the overall portfolio realization rates.**

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 PY2014. As program documentation recommendations from the PY2012 EM&V effort are to come into effect in PY2014, the EM&V team did expect program documentation scores to improve between PY2012 and PY2014.

7.1.2 Cost-effectiveness results

Sharyland’s overall portfolio had a cost-effectiveness of 1.42, or 1.54 without low-income programs.

The most cost-effective program was Residential SOP. The least cost-effective program was Customized Commercial MTP, which did not pass cost-effectiveness testing for the program year, though MTPs may demonstrate cost-effectiveness over a period longer than one year pursuant to PUCT rule. Several programs had benefit-cost ratios of 0 since they expended funds in 2014 but did not generate any savings.

The lifetime cost of PY2014 savings was \$0.018 per kWh and \$31.99 per kW.



7. Impact Evaluation Results—Sharyland...

Table 7-3. Sharyland Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	2.10	1.42	1.18
Total Portfolio excluding low-income programs	2.26	1.54	1.27
Commercial Sector	0.33	0.33	0.28
Commercial SOP	0.00	0.00	0.00
Load Management SOP	0.00	0.00	0.00
Customized Commercial MTP	0.42	0.42	0.36
Residential Sector	2.88	1.93	1.60
Residential SOP	3.10	1.94	1.51
Hard-to-Reach SOP	2.05	1.90	1.90
Low-Income	1.90	1.16	1.16
Targeted Low Income Weatherization Program	1.90	1.16	1.16
Pilots	0.00	0.00	0.00
SCORE Pilot MTP	0.00	0.00	0.00

7.2 DETAILED FINDINGS—COMMERCIAL

7.2.1 Commercial market transformation

A. Customized Commercial Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)*	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)*	Program Documentation Score
2.2%	8	8	100.0%	1.5%	27,545	27,545	100.0%	Limited

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 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 Customized Commercial MTP were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent. For this program the



7. Impact Evaluation Results—Sharyland...

PY2014 evaluation efforts focused on desk reviews and on-site M&V. There were no adjustments to any of the projects savings calculations reviewed.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for a portion of each of the three sites that had desk reviews completed because sufficient documentation was provided for the sites. In particular, the evaluation did not receive a formal M&V report for one of the sites that implemented a custom methodology. For two sites, the evaluation did not receive documentation to confirm key input assumptions used by the deemed calculations or that pre/post inspections occurred, which would generally confirm such parameters. Since sufficient documentation was provided for less than 70 percent of the sampled sites, the program documentation for these estimates is limited.

7.3 DETAILED FINDINGS—RESIDENTIAL

7.3.1 Residential standard offer

A. Residential Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)*	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)*	Program Documentation Score
78.9%	299	248	82.9%	82.8%	1,482,930	828,216	55.9%	Good

Completed Desk Reviews*	On-site M&V
48	24

*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 Sharyland RSOP were 248 kW and 828,216 kWh, with realization rates of 83 percent and 56 percent for demand and energy, respectively. The on-site M&V findings for a large multi-family project discussed below primarily accounted for the lower realization rates. The on-site findings were discussed with Sharyland who is planning increased rigor of post-inspection in PY2015 to address the identified issues.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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



7. Impact Evaluation Results—Sharyland...

- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

i. Data review

The data review realization rates are 103 percent for energy savings and 105 percent for demand 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 close to 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.

Air infiltration eligibility requirements. TRM V1.0 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. In particular, for health and safety reasons, final ventilation levels are specified within the TRM, with savings not awarded for reducing leakage below these levels. In four homes, post-treatment infiltration levels fell below the minimum final ventilation. Ex-post savings calculated for these homes were based on reduction to the minimum ventilation level; however, ex-ante savings were calculated for the full reduction (i.e., the minimum ventilation limit was not applied).

Low-flow showerhead savings attribution. Data review realization rates were influenced by differing treatment of low-flow showerhead measures. Where multiple showerheads were installed in a home, the EM&V team awarded savings on a per-showerhead basis. However, in the ex-ante calculation savings appear to have been awarded per household. These changes resulted in a small 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 0.004 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 48 projects, and resulted in desk review realization rates of 100 percent for both energy and demand savings, rounded to the nearest percentage point. The EM&V team identified a minor discrepancy between the tracking system data and the supporting documentation, leading to differences in calculated savings for one of the projects. The team noted a transcription error in the post-retrofit air leakage for one air infiltration



7. Impact Evaluation Results—Sharyland...

reduction measure, resulting in a minor decrease in the realization rate, which rounded to 100 percent.

iii. Site visits

Site visits were conducted for 24 projects, resulting in site visit realization rates of 54 percent and 79 percent for energy and demand savings, respectively. Twenty-three of the 24 visited sites received desk reviews.

Through the site review process, the EM&V team identified differences only in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is expected to be within ± 20 percent using a Duct Blaster test; for infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected and discussed with the M&V team. The evaluation team applied data values collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Discrepancies beyond ± 20 percent were noted for 19 of the 24 duct improvement projects. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 248 CFM₂₅; all of the M&V team-observed leakages were higher than those values reported. Overall, the adjustments made based on on-site observations for this measure resulted in a large net decrease in the site visit realization rate and was the primary driver for the low portfolio realization rate.

Air infiltration improvements. Discrepancies beyond ± 10 percent were noted for 17 of the 24 homes that received a site visit after air sealing was performed. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 429 CFM₅₀; all of the M&V team observed leakages were lower than those values reported where a discrepancy greater than 10 percent was observed. The adjustments made based on on-site observations for this measure resulted in a large net increase in the site visit realization rate.

iv. Documentation

Documentation was requested for a total of 144 sites through the supplemental data request. Of these sites, documentation was provided for 143, all of which 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.



7. Impact Evaluation Results—Sharyland...

B. Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
14.5%	55	52	94.4%	12.7%	227,787	208,539	91.6%	Good

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

Evaluated savings for the Sharyland Hard-to-Reach SOP were 52 kW and 208,539 kWh, with realization rates of 94 percent and 92 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

Details on data review, desk review, and site visit 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 and demand 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.



7. Impact Evaluation Results—Sharyland...

The data review realization 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, 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 17 projects, and resulted in desk review realization rates of 100 percent for both energy and demand savings. No discrepancies were identified by the EM&V team through this review.

iii. Site visits

Site visits were conducted for five projects, resulting in site visit realization rates of 92 percent and 94 percent for energy and demand savings, respectively. All of the visited sites received desk reviews.

Through the site review process, the EM&V team identified differences only in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is expected to be within ± 20 percent using a Duct Blaster test; for infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data values collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Discrepancies beyond ± 20 percent were noted for two of the three duct improvement projects. The M&V team could not verify the leakage in the third house due to foundation issues that caused doors to seat improperly in their frames, preventing the team from properly pressurizing the house. In the two cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 165 CFM₂₅; both of the observed leakages were higher than those values reported. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

Air infiltration improvements. A discrepancy beyond ± 10 percent was noted for the one homes that received a site visit after air sealing was performed. The team observed a post-treatment leakage of 535 CFM₅₀ above the value reported. The leakage measured by the M&V team was less than 10 percent below the reported initial leakage, leading 0 savings to be awarded for this site. The adjustments made based on on-site observations for this measure resulted in a large net decrease in the site visit realization rate.



7. Impact Evaluation Results—Sharyland...

iv. Documentation

Documentation was requested for a total of 17 sites through the supplemental data request. Of these sites, documentation was provided for 17, all of which 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.

7.3.2 Targeted Low-Income Weatherization Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
4.4%	17	10	60.3%	2.9%	52,514	32,033	61.0%	Good

Completed Desk Reviews*	On-site M&V
21	3

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

Evaluated savings for the Sharyland Targeted Low-Income Weatherization program were 10 kW and 32,033 kWh, with realization rates of 60 percent and 61 percent for demand and energy, respectively. The on-site M&V for one project largely accounted for the decrease in the realization rates. This project, which could not be verified through on-site M&V to have electric space heating, is likely an anomaly.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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



7. Impact Evaluation Results—Sharyland...

i. Data review

The data review realization rates are 100 percent, rounded to the nearest percent, for both energy and demand 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.

While the data review realization rate is effectively 100 percent, there were several minor systematic differences that are worth noting.

Legacy deemed savings values. The team determined that the data review realization rates were influenced by application of deemed savings from petition 27903 for installations of ENERGY STAR® refrigerator measures. These deemed savings values have been superseded by petition 38025, which is the basis for refrigerator savings in TRM V1.0. Nevertheless, savings for these measures account for 5 percent of evaluated energy savings and 2 percent of demand savings for the Sharyland Targeted Low-Income Weatherization program, and therefore do not greatly influence this program's realization rate.

Low-flow showerhead savings attribution. Data review realization rates were influenced by differing treatment of low-flow showerhead measures. Where multiple showerheads were installed in a home, the EM&V team awarded savings on a per-showerhead basis. However, in the ex-ante calculation savings appear to have been awarded per household. These changes resulted in a small 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 0.004 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 21 projects, and resulted in desk review realization rates of 100 percent for both energy and demand savings. No discrepancies were identified by the EM&V team through this review.

iii. Site visits

Site visits were conducted for three projects, resulting in site visit realization rates of 61 percent and 60 percent for energy and demand savings, respectively. All of the visited sites received desk reviews.

Discrepancies in claimed savings were observed for ceiling and insulation measures installed at a single home. Tracking data for this project indicate an electric resistance furnace as heating equipment; however, the M&V team observed that the home was instead heated by a wood-burning stove (with no apparent presence of other electric space heating). Therefore, the team assigned 0 savings for these measures.



7. Impact Evaluation Results—Sharyland...

iv. Documentation

Documentation was requested for a total of 21 sites through the supplemental data request. Of these sites, documentation was provided for 21, all of which 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.

7.4 DETAILED FINDINGS—LOAD MANAGEMENT

7.4.1 Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
NA	NA	NA	NA	NA	NA	NA	NA	NA

Completed Desk Reviews	On-site M&V
NA	NA

The PY2014 evaluation activities found that Sharyland did not report any load impact or energy savings for its Load Management Standard Offer Program.



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.

8.1 KEY FINDINGS

8.1.1 Evaluated savings

SWEPCO's evaluated savings for PY2014 were 12,530 for demand (kW) and 17,350,971 energy (kWh) savings. Both the kW and kWh realization rates are very close to 100 percent.

The primary driver of the realization rates being slightly less than 100 percent were residential on-site M&V findings for the air infiltration reduction and duct efficiency improvement measures.

Table 8-1 shows the claimed and evaluated demand savings for SWEPCO's portfolio and broad customer sector/program categories for PY2014.

Table 8-1. SWEPCO Program Year 2014 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Precision at 90% Confidence
Total Portfolio		12,582	12,530	99.6%	2.5%
Commercial Sector	16.1%	2,024	2,025	100.1%	15.1%
Residential Sector	18.0%	2,260	2,207	97.6%	4.1%
Load Management	65.9%	8,297	8,297	100.0%	0.0%
Pilots	0.0%	1	1	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 PY2014.



Table 8-2. SWEPCO Program Year 2014 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2014 Claimed Demand Savings (kWh)	2014 Evaluated Demand Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		17,486,362	17,350,971	99.2%	3.3%
Commercial Sector	62.6%	10,945,467	10,921,324	99.8%	4.0%
Residential Sector	36.9%	6,448,168	6,336,920	98.3%	5.8%
Load Management	0.5%	85,856	85,856	100.0%	0.0%
Pilots	0.0%	6,871	6,871	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. Program-level results should only be used to provide insight into how individual programs are affecting the overall portfolio realization rates.**

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 PY2014. As program documentation recommendations from the PY2012 EM&V effort are to come into effect in PY2014, the EM&V team did expect program documentation scores to improve between PY2012 and PY2014.

8.1.2 Cost-effectiveness results

SWEPCO’s overall portfolio had a cost-effectiveness of 2.27.

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



8. Impact Evaluation Results—Southwestern Electric Power Company...

ENERGY STAR® Appliances program was discontinued in 2013 and the results in 2014 are based on a very small number of rebates that were processed in 2014.

The lifetime cost of PY2014 evaluated savings was \$0.01 per kWh and \$20.12 per kW.

Table 8-3. SWEPCO Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	2.29	2.27	1.97
Commercial Sector	2.52	2.52	2.14
Commercial Solutions MTP	3.18	3.18	2.70
Commercial SOP	3.51	3.51	2.82
Open MTP	1.38	1.33	1.20
SCORE MTP	1.48	1.52	1.42
Residential Sector	2.17	2.13	1.85
CoolSaver A/C Tune-Up MTP	1.00	1.00	0.90
ENERGY STAR® Appliances	0.23	0.23	0.14
Home Energy Checkup	0.00	0.00	0.00
Residential SOP	2.59	2.63	2.05
Hard-to-Reach SOP	2.08	1.92	1.92
Load Management	1.61	1.61	1.61
Load Management SOP	1.61	1.61	1.61

8.2 DETAILED FINDINGS—COMMERCIAL

8.2.1 Commercial Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
5.3%	665	664	99.9%	22.3%	3,906,317	3,910,224	100.1%	Limited

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



8. Impact Evaluation Results—Southwestern Electric Power Company...

Evaluated realization rates for the SWEPCO CSOP were 100 percent for both demand and energy savings. The PY2014 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 minor adjustments to the claimed savings for three of the reviewed projects. These adjusted kWh realization rates ranged from 96 percent to 103 percent.

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

Project ID #690845: The ex-ante documentation for this site reported both “Service” and “Office” areas in the lighting calculation form. Based on the on-site M&V visit findings, the EM&V team changed all the reported building types and corresponding hours of operation for this project to “Office.” This resulted in a 3 percent increase in energy savings, providing a 103 percent energy realization rate. The demand savings reduced by 5 percent, resulting in an evaluated demand realization rate of 95 percent. Similar conclusions were drawn during the desk review process, which had an energy realization rate of 103 percent and a demand realization rate of 95 percent. The EM&V team found that the ex-ante documentation was insufficient and lacked any reasoning to justify the use of two different building types within the claimed savings calculations.

Project ID #690848 & #690849: Both projects involved lighting replacements. The EM&V team found that the reported building types for these projects were “Office” and “Non-Refrigerated Warehouse.” However, after investigating the facility type, the site photographs and looking up the address online, the facility was determined to be a warehouse. Therefore, the savings calculations for both projects were modified based on a “Non-Refrigerated Warehouse” building type. The evaluated energy and demand realization rate for project ID #690848 is 97 percent and for project ID #690849 is 96 percent. An on-site verification was not performed for either of these sites.

As part of the PY2012 evaluation report, 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 15 (40 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 building types, equipment quantities and equipment specifications (wattages, efficiencies, ballast factors, etc.). Because sufficient documentation was provided for fewer than 70 percent of the projects in the sample, the EM&V team assigned a program documentation score of limited for the SWEPCO CSOP PY2014 projects.



8. Impact Evaluation Results—Southwestern Electric Power Company...

8.2.2 Commercial Market Transformation Programs

A. SCORE Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
2.3%	291	299	102.5%	6.1%	1,071,335	1,104,547	103.1%	Good

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.

Evaluated savings for the SCORE MTP resulted in realization rates of 103 percent for both demand and energy. The realization rates were driven by savings adjustments from on-site survey results for one site. For site #731878, discrepancies in fixture counts resulted in an increase in savings for the project (site #731878 kWh realization rate equal to 106 percent and kW realization rate equal to 104 percent). The changes in fixture counts for this new construction project were not reported in the post-installation verification forms provided to the EM&V team and therefore were not captured by the desk review.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for six of the six 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.

B. Commercial Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
5.7%	722	723	100.1%	25.1%	4,383,686	4,383,686	100.0%	Good



8. Impact Evaluation Results—Southwestern Electric Power Company...

Completed Desk Reviews*	On-site M&V
6	1

*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.

Evaluated savings for the Commercial Solutions MTP resulted in realization rates of 100 percent for both demand and energy. The adjustments made to the project savings calculations provided for insignificant differences in claimed versus evaluated savings. Savings adjustments were made to only one desk review, which resulted overall in insignificant impacts at the program level due to the small project size. For site #735153, the new unit capacity was found to vary slightly from reported resulting in understated project savings. The change in savings resulted in increased project savings (site #735153 kWh and kW realization rates equal to 103 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for six of the six 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, specifically a final M&V report for a project originally tracked as deemed. Since sufficient documentation was provided for 100 percent of the sampled sites, the program documentation score for these estimates is good.

8.2.3 Open Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
2.7%	346	339	98.2%	9.1%	1,584,129	1,522,867	96.1%	Good

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.

Evaluated savings for the Open MTP resulted in realization rates of 98 percent for demand and 96 percent for energy. The realization rates were mainly driven by savings adjustments made from tracking system reviews, desk reviews, and onsite survey results. A total of two projects had realization rates that were not equal to 100 percent and were adjusted. These adjusted realization rates ranged from 94 to 117 percent for demand and 91 to 95 percent for energy. From the two projects with adjusted realization rates, one project was found to be a



8. Impact Evaluation Results—Southwestern Electric Power Company...

major driver for the higher demand realization rate, and the other project was found to be a major driver for the lower energy realization rate. Two projects had savings adjusted by 5 percent or more.

The project specific savings adjustments that were the major drivers of the program level realization rate are listed below by Project ID:

Project ID #730821: The reported building type for this project was an office. However, based on the space descriptions and photographic documentation assessed as part of the desk review, the building type was changed to a service (non-food) building type. This resulted in a drop in operating hours and increase in demand coefficient. These findings decreased energy savings and increased demand savings (site #730821 kWh realization rate equal to 91 percent and kW realization rate equal to 117 percent).

Project ID #731899: The new unit capacities found during the on-site survey varied slightly from reported values (4.75 tons versus 5 tons reported). The change in savings resulted in decreased project savings (site #731899 kWh and kW realization rates equal to 95 percent). The new equipment capacities were identified incorrectly on the invoice provided to the EM&V team and therefore were not captured by the desk review. Also, the energy guides within the backup supporting documentation provided the SEER rating but did not provide unit capacities.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for nine of the ten sites that had desk reviews completed because sufficient documentation was provided for the sites. Since sufficient documentation was provided for 90 percent of the sampled sites, the program documentation score for these estimates is good.

8.3 DETAILED FINDINGS—RESIDENTIAL

8.3.1 Residential Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
9.1%	1,139	1,161	101.9%	19.4%	3,389,722	3,448,025	101.7%	Good

Completed Desk Reviews*	On-site M&V
63	16

*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.

Evaluated savings for the RSOP were 1,161 kW and 3,448,025 kWh, with realization rates of 102 percent for both demand and energy.



8. Impact Evaluation Results—Southwestern Electric Power Company...

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

A. Data review

The data review realization rates are 100 percent for both energy and demand 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.

Air infiltration eligibility requirements. TRM V1.0 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.¹² For homes where the initial leakage exceeds 4.0 CFM₅₀ 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 SWEPCO Residential Standard Offer Program, one project reported positive ex-ante savings where infiltration levels remained within 10 percent of the initial cap post-retrofit. The team did not assign ex-post savings for this project, resulting in a small decrease in the realization rate.

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.



8. Impact Evaluation Results—Southwestern Electric Power Company...

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 increase in the realization rates for pipe wrap and water heater tank insulation 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 0.003 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 and demand savings 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 63 projects and resulted in desk review realization rates of 104 percent and 105 percent for energy and demand savings, respectively, rounded to the nearest percentage point. The EM&V team identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for 11 of the projects. The team noted the following transcription errors:

- The pre- or post-treatment air infiltration values (i.e., CFM) in the tracking database did not match the values in the project documentation for two projects. This resulted in a minor increase in the realization rate.
- For one project claiming duct sealing savings, the reported AC unit tonnage was smaller in the project documentation than the value shown in the tracking database. This resulted in a minor decrease in the realization rate.
- For eight homes that received ceiling insulation, one or more savings calculation inputs (i.e., the reported heating type, square footage, or pre-treatment R-value) recorded in the tracking database did not reflect those found in project documentation. This resulted in an increase in the realization rate.

C. Site visits

Site visits were conducted for 16 projects, resulting in site visit realization rates of 98 percent and 97 percent for energy and demand savings, respectively. All of the visited sites received desk reviews.

Through the site review process, the EM&V team identified differences only in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is



8. Impact Evaluation Results—Southwestern Electric Power Company...

expected to be within ± 20 percent using a Duct Blaster test; for infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data values collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Discrepancies beyond ± 20 percent were noted for three of the four duct improvement projects, while the remaining home could not have duct leakage verified during the site visit due to ongoing construction and fan operation and was not included in the analysis. In cases where testing could be performed, the team observed differences in post-treatment leakage of up to 167 CFM₂₅; however, the M&V team observed leakages both higher and lower than those values reported. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

Air infiltration improvements. Discrepancies beyond ± 10 percent were noted for all three of the homes that received a site visit after air sealing was performed. The team observed differences in post-treatment leakage of up to 781 CFM₅₀; however, the M&V team observed leakages both higher and lower than those values reported. Overall, the adjustments made based on on-site observations for this measure resulted in a net increase in the site visit realization rate.

D. Documentation

Documentation was requested for a total of 63 sites through the supplemental data request. All 63 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.

8.3.2 CoolSaver® A/C Tune-Up Market Transformation Program (Residential)

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
1.9%	244	244	100.0%	3.2%	565,043	565,043	100.0%	Good

Completed Desk Reviews*	On-site M&V
5	21

*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.



8. Impact Evaluation Results—Southwestern Electric Power Company...

Evaluated savings for the CoolSaver A/C Tune-up Pilot MTP were the same as the claimed savings; thus, realization rates for both kW and kWh are 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 the customer application and invoice, any calculators used, and reports of QA/QC or M&V activity if conducted. What the EM&V team received for each project was an invoice from the contractor, the Incentive Check Request, and the Tune-up Form. The implementer also provided program documentation, including the Contractor Manual, Contractor FAQs, and the CoolSaver 2013 M&V Plan. This project documentation included enough information that critical inputs to calculating savings could be determined and compared to the CoolSaver 2013 M&V Plan. The challenges the EM&V team encountered were that the contractor invoices and Tune-Up Forms did not indicate that the condenser coil was cleaned or that the airflow was adjusted to proper CFM/ton per the CoolSaver A/C Tune-up Program Manual. Tasks might have been performed, but supporting documents do not clearly indicate all tasks were completed. Because key parameters for savings calculations were identified, this ambiguous documentation did not affect savings.

Because the EM&V team received sufficient documentation for all sampled sites, we were able to verify key inputs and assumptions. As a result, the program documentation score for these estimates is good.

8.3.3 Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
7.0%	877	802	91.5%	14.3%	2,493,403	2,323,852	93.2%	Good

Completed Desk Reviews*	On-site M&V
31	8

*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.

Evaluated savings for the Hard-to-Reach SOP were 802 kW and 2,323,852 kWh, with realization rates of 92 percent and 93 percent for demand and energy, respectively.

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



8. Impact Evaluation Results—Southwestern Electric Power Company...

- 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

A. *Data review*

The data review realization rates are 101 percent for energy savings and 102 percent for demand 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 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.

Legacy deemed savings values. The team determined that the data review realization rates were influenced by application of deemed savings from petition 27903 for installations of faucet aerator and low-flow showerhead measures, with no increase in savings corresponding with installation of multiple showerheads. These deemed savings values have been superseded by petition 41722, which is the basis for aerator and showerhead savings in TRM V1.0. Nevertheless, combined savings for these measures account for 0.5 percent of evaluated energy and demand savings for the SWEPCO Hard-to-Reach Standard Offer Program and therefore do not greatly influence this program's realization rate.

Air infiltration eligibility requirements. TRM V1.0 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.¹³ For homes where the initial leakage exceeds 4.0 CFM₅₀ 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.

¹³ 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.



8. Impact Evaluation Results—Southwestern Electric Power Company...

For the SWEPCO Hard-to-Reach Standard Offer Program, five projects reported zero savings where the initial leakage cap was applied, while the team calculated savings for these sites relative to the cap. Furthermore, one project reported positive ex-ante savings where infiltration levels remained within 10 percent of the initial cap post-retrofit. The team did not assign ex-post savings for this project. The overall effect was 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, ceiling insulation, pipe wrap, and water heater tank insulation measures. 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 0.004 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 and demand savings 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 31 projects and resulted in desk review realization rates of 100 percent for energy and demand savings, rounded to the nearest percentage point. The EM&V team identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for two of the projects. The team noted the following transcription errors:

- The pre-treatment duct leakage value (i.e., CFM) in the tracking database did not match the value in the project documentation for one project. This resulted in a minor decrease in the realization rate.
- The post-treatment air infiltration value (i.e., CFM) in the tracking database did not match the value in the project documentation for one project. This resulted in a minor decrease in the realization rate.

C. Site visits

Site visits were conducted for eight projects, resulting in site visit realization rates of 92 percent and 90 percent for energy and demand savings, respectively. All of the visited sites received desk reviews.



8. Impact Evaluation Results—Southwestern Electric Power Company...

Through the site review process, the EM&V team identified differences only in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is expected to be within ± 20 percent using a Duct Blaster test; for infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data values collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Site visits were conducted for four duct improvement projects. However, the team could not verify the duct leakage during the site visit for three of these homes due to potential inconsistencies in testing procedure, an unexplained increase in duct leakage, or due to whole-house fan operation during testing. Therefore, measured leakage from these sites was not included in the analysis. For the remaining home, the minimal difference between the post-treatment leakage reported and that measured on-site (3 CFM₂₅) led to a minor decrease in the site visit realization rate.

Air infiltration improvements. Discrepancies beyond ± 10 percent were noted for five of the six homes that received a site visit after air sealing was performed, while the remaining home could not have the infiltration level verified during the site visit due to a testing set-up error and was not included in the analysis. The team observed differences in post-treatment leakage of up to 912 CFM₅₀; all of the M&V team observed leakages were higher than those values reported. In two of the cases where sizable differences were observed between the reported and measure infiltration, field staff noted areas where sealing was either degraded or had not been performed. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

D. Documentation

Documentation was requested for a total of 31 sites through the supplemental data request. All 31 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

8.4.1 Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
65.9%	8,297	8,297	100.0%	0.5%	85,856	85,856	100.0%	Good



8. Impact Evaluation Results—Southwestern Electric Power Company...

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 PY2014 evaluation activities found that the individual participant load impact calculations in the work papers supplied were the same as those validated by using the individual customer interval load data. There were nine reported program participants in 2014, and this is the number of participants for which the evaluation team received work papers and interval load data. There were three events (7/25, 8/22, and 8/25) called during the summer of 2014. All events lasted for four hours.

Evaluated savings for the SWEPCO Load Management Standard Offer Program were 8,297 kW and 85,856 kWh. The realization rate for kW was 100 percent and the realization rate for kWh was 100 percent.



9. IMPACT EVALUATION RESULTS—TEXAS NEW MEXICO POWER COMPANY

This section presents the evaluated savings and cost-effectiveness results for TNMP’s energy efficiency portfolio. The key findings are summarized first, followed by details for each program in the portfolio.

9.1 KEY FINDINGS

9.1.1 Evaluated savings

TNMP’s evaluated savings for PY2014 were 9,145 for demand (kW) and 15,438,546 for energy (kWh) savings. The overall kW portfolio realization rate is 95 percent and the overall kWh portfolio realization rate is 90 percent. Evaluated savings are lower than claimed savings primarily due to on-site M&V findings for RSOP. On-site adjustments were primarily made for duct and air infiltration improvements, improperly recorded heating systems and discrepancies in ceiling insulation R-values.

Table 9-1 shows the claimed and evaluated demand savings for TNMP’s portfolio and broad customer sector/program categories for PY2014.

Table 9-1. TNMP Program Year 2014 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kw)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kw)	Precision at 90% Confidence
Total Portfolio		9,602	9,145	95.2%	3.9%
Commercial Sector	17.6%	1,693	1,692	99.9%	0.0%
Residential Sector	40.8%	3,916	3,480	88.9%	10.2%
Load Management	41.6%	3,993	3,973	99.5%	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 9-2 shows the claimed and evaluated energy savings for TNMP’s portfolio and broad customer sector/program categories for PY2014.



Table 9-2. TNMP Program Year 2014 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		17,118,627	15,438,546	90.2%	9.4%
Commercial Sector	39.0%	6,676,694	6,672,776	99.9%	0.2%
Residential Sector	61.0%	10,433,988	8,757,835	83.9%	16.5%
Load Management	0.0%	7,945	7,945	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. Program-level results should only be used to provide insight into how individual programs are affecting the overall portfolio realization rates.**

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 PY2014. As program documentation recommendations from the PY2012 EM&V effort are to come into effect in PY2014, the EM&V team did expect program documentation scores to improve between PY2012 and PY2014.

9.1.2 Cost-effectiveness results

TNMP’s overall portfolio had a cost-effectiveness of 1.72, or 1.87 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.



9. Impact Evaluation Results—Texas New Mexico Power Company...

The lifetime cost of PY2014 evaluated savings was \$0.012 per kWh and \$21.34 per kW.

Table 9-3. TNMP Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results	Net Savings Results
Total Portfolio	1.90	1.72	1.46
Total Portfolio excluding low-income programs	2.07	1.87	1.58
Commercial Sector	1.91	1.91	1.70
Open for Small Business MTP	1.28	1.27	1.15
Commercial Solutions MTP	2.34	2.34	1.99
SCORE/CitySmart MTP	2.09	2.09	1.94
Residential Sector	2.24	1.91	1.54
New Homes Residential MTP	2.76	2.76	1.93
Residential SOP	2.46	1.93	1.51
Hard-to-Reach SOP	1.39	1.43	1.43
Low-Income	1.70	1.68	1.68
Low Income Weatherization	1.70	1.68	1.68
Load Management	1.20	1.19	1.19
Load Management SOP	1.20	1.19	1.19

9.2 DETAILED FINDINGS—COMMERCIAL

9.2.1 Commercial Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
6.8%	649	649	100.0%	16.4%	2,803,294	2,800,771	99.9%	Good

Completed Desk Reviews*	On-site M&V
7	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.

Evaluated savings for the Commercial Solutions MTP resulted in realization rates of 100 percent for kW and 100 percent for kWh. For this program the PY2014 evaluation efforts



9. Impact Evaluation Results—Texas New Mexico Power Company...

focused on desk reviews and on-site M&V. The realization rates were affected by savings adjustments made from desk review and on-site M&V results for one project as further described below.

Project ID #730398: The reported building type for this project was a mix of an office, warehouse, and outdoor building types. Based on the space descriptions and photographic documentation assessed as part of the desk review and on-site M&V visit findings, the predominant building type was changed to warehouse (non-refrigerated). This resulted in a drop in operating hours. Also, the tracking data does not include the negative linear fluorescent savings. During the on-site M&V effort, occupancy sensors were found within the offices and warehouse portions of the building, which were not included in the reported savings. The occupancy sensors were identified within the post-inspection field notes as part of the desk review. However, they were not included within the post inspection or final reported calculators, with no notes as to their omission. Further information is necessary to include these occupancy sensors within the desk review results, which would further increase savings results for this project. Overall, these findings decreased energy and demand savings (desk review kWh realization rate equal to 94 percent and kW realization rate equal to 96 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, calculation methodology, specifications) for seven of the seven 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 for these estimates is good.

A. *Tune-up measures*

Desk reviews were completed for one project site that involved multiple tune-up measures. The reported savings methodology within the program tracking system applied for the tune-up measures at this project site was stipulated. As measure-level calculation inputs were available within the tracking system for the TNMP Commercial Solutions MTP, the EM&V team was able to calculate energy savings for each unit that received a tune-up.

The challenges the EM&V team encountered were that the stipulated tune-up methodology was essentially the same as the full M&V methodology measures also used by the program. We learned that the additional data points being collected in the field in PY2014 as part of the full M&V process by the implementer were not directly being used to calibrate the model and hence not directly affecting current PY2014 projects. Additionally, the contractor invoices and field reports did not indicate that the condenser coil was cleaned or that the airflow was adjusted to proper CFM/ton per the CoolSaver A/C Tune-up Program Manual. The manual does not include the methodology to adjust measured capacity and EERs to ARI conditions, which is a key step needed to verify those values. Additionally, all six steps required for CoolSaver to complete the tune-ups may have been performed, but supporting documents do not clearly indicate all tasks were completed. Because key parameters for savings calculations were identified, this ambiguous documentation did not affect savings.

Currently, the PUCT has not approved a deemed savings value or deemed calculation method for tune-up measures. Until such an approval is given, regular calibrations of the model being used to develop these critical savings factors should be completed annually at a



9. Impact Evaluation Results—Texas New Mexico Power Company...

minimum. Additional findings of a census review completed for all tune-up measures for all Texas programs in PY2014 is provided separately.

9.2.2 SCORE/CitySmart Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
7.5%	723	723	100.0%	13.5%	2,312,198	2,312,198	100.0%	Good

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 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 SCORE/CitySmart MTP were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent. For this program the PY2014 evaluation efforts focused on desk reviews and on-site M&V. There were no adjustments to any of the projects savings calculations reviewed.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, calculation methodology, specifications) for six of the six 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 for these estimates is good.

9.2.3 Open for Small Business Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
3.3%	321	321	99.9%	9.1%	1,561,202	1,559,641	99.9%	Good



9. Impact Evaluation Results—Texas New Mexico Power Company...

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 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 Open MTP were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent. For this program the PY2014 evaluation efforts focused on desk reviews and on-site M&V. There were no adjustments to any of the projects' savings calculations reviewed.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, calculation methodology, specifications) for ten of the ten 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 for these estimates is good.

9.3 DETAILED FINDINGS—RESIDENTIAL

9.3.1 Residential Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
25.0%	2,397	1,959	81.7%	43.7%	7,488,321	5,750,282	76.8%	Good

Completed Desk Reviews*	On-site M&V
60	20

*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 1,959 kW and 5,750,282 kWh, with realization rates of 82 percent and 77 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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



9. Impact Evaluation Results—Texas New Mexico Power Company...

- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

A. Data review

The data review realization rates are 100 percent for energy savings and 101 percent for demand 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 very close to 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.

Air infiltration eligibility requirements. TRM V1.0 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. In particular, for health and safety reasons, final ventilation levels are specified within the TRM, with savings not awarded for reducing leakage below these levels. In three homes, post-treatment infiltration levels fell below the minimum final ventilation. Ex-post savings calculated for these homes were based on reduction to the minimum ventilation level; however, ex-ante savings for one of these homes were reported as 0, and for the remaining two were calculated for the full reduction (i.e., the minimum ventilation limit was not applied).

Low-flow showerhead savings attribution. Data review realization rates were influenced by differing treatment of low-flow showerhead measures. Where multiple showerheads were installed in a home, the EM&V team awarded savings on a per-showerhead basis. However, in the ex-ante calculation savings appear to have been awarded per household. These changes resulted in a small 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 0.004 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 divergence in energy and demand savings for a duct sealing measure that may stem from a data input or calculation error. In this case, the ex-ante savings were reported as 0. The impact of this discrepancy is small, however, and does not appear to indicate any systematic error. The overall effect was an increase in the realization rate.



9. Impact Evaluation Results—Texas New Mexico Power Company...

B. Desk review

Desk reviews were completed for 60 projects, and resulted in desk review realization rates of 99 percent for both energy and demand savings. The EM&V team identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for four of the projects.

- The team noted transcription errors for two duct sealing measures—a difference in the pre-treatment duct leakage as well as a difference in the cooling tonnage between the tracking database and the project documentation. These instances led to a decrease in the realization rate.
- For one ceiling insulation project, the team noted that the area recorded in the tracking database was greater than the area found in project documentation, which resulted in a decrease in the realization rate.
- Lastly, the team noted a transcription error in the pre-retrofit air leakage for one air infiltration reduction measures, resulting in a decrease in the realization rate.

C. Site visits

Site visits were conducted for 20 projects, resulting in site visit realization rates of 77 percent and 82 percent for energy and demand savings, respectively. All of the visited sites received desk reviews.

Through the site review process, the EM&V team identified differences in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is expected to be within ± 20 percent using a Duct Blaster test; for infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data values collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Discrepancies beyond ± 20 percent were noted for 6 of the 11 duct improvement projects. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 540 CFM₂₅; all of the M&V team-observed leakages were higher than those values reported where a discrepancy greater than 20 percent was observed. In the two homes with the largest differences between the measured and reported post-treatment leakages, M&V staff noted that the work performed appeared to have been of poor quality, in one case requiring that M&V staff perform limited sealing in order to complete testing (note that no savings were awarded for this site). In one additional home, the heating equipment type reported in the tracking database, an electric resistance furnace, was found to differ from the heat pump observed on-site. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.



9. Impact Evaluation Results—Texas New Mexico Power Company...

Air infiltration improvements. Discrepancies beyond ± 10 percent were noted for four of the eight homes that received a site visit after air sealing was performed. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 624 CFM₅₀; however, the M&V team observed leakages both higher and lower than those values reported. At one home, the leakage measured by the M&V team was less than 10 percent below the reported initial leakage, leading 0 savings to be awarded for this site. The adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

Ceiling insulation. Two sites that received ceiling insulation showed discrepancies between the observed and reported measure inputs in either the initial, pre-retrofit R-value of the ceiling insulation, or in the heating equipment type serving the home. At one site, the team verified that a heat pump was installed rather than an electric resistance furnace indicated in the tracking data. At another site, they found that 4-inch fiberglass batts were in place prior to treatment, with an R-value of approximately R-8 rather than R-1 as indicated in the tracking data. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

D. Documentation

Documentation was requested for a total of 60 sites through the supplemental data request. Of these sites, documentation was provided for 60, all of which 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.

9.3.2 Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
5.2%	496	500	100.8%	9.3%	1,584,491	1,653,733	104.4%	Good

Completed Desk Reviews*	On-site M&V
43	8

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

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 500 kW and 1,653,733 kWh, with realization rates of 101 percent and 104 percent for demand and energy, respectively.

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



9. Impact Evaluation Results—Texas New Mexico Power Company...

- 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

A. *Data review*

The data review realization rates are 100 percent, rounded to the nearest percent, for both energy and demand 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.

While the data review realization rate is effectively 100 percent, there were several minor systematic differences that are worth noting.

Low-flow showerhead savings attribution. Data review realization rates were influenced by differing treatment of low-flow showerhead measures. Where multiple showerheads were installed in a home, the EM&V team awarded savings on a per-showerhead basis. However, in the ex-ante calculation savings appear to have been awarded per household. These changes resulted in a small 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 0.004 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 and demand savings for a small number of duct sealing 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 43 projects, and resulted in desk review realization rates of 100 percent for both energy and demand savings, rounded to the nearest percentage point. The EM&V team identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for three of the



9. Impact Evaluation Results—Texas New Mexico Power Company...

projects. The team noted a transcription error in the heating type for one home that affected two measures, duct sealing and air infiltration reduction. The team also noted a transcription error in the pre-treatment duct leakage for another duct sealing project. Overall, these differences netted out to a 100 percent realization rate.

C. Site visits

Site visits were conducted for eight projects, resulting in site visit realization rates of 104 percent and 100 percent for energy and demand savings, respectively, rounded to the nearest percent. All of the visited sites received desk reviews.

Through the site review process, the EM&V team identified differences only in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is expected to be within ± 20 percent using a Duct Blaster test; for infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data values collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Discrepancies beyond ± 20 percent were noted for three of the eight duct improvement projects. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 52 CFM₂₅; all of the M&V team observed leakages were higher than those values reported where a discrepancy greater than 20 percent was observed. In one additional home, the heating equipment type reported in the tracking database, a gas furnace, was found to differ from the electric resistance furnace observed on-site, increasing energy but not demand savings. Overall, the adjustments made based on on-site observations for this measure resulted in a small net increase in the site visit energy realization rate, but a decrease in the site visit demand realization rate.

Air infiltration improvements. Discrepancies beyond ± 10 percent were noted for two of the five homes that received a site visit after air sealing was performed. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 188 CFM₅₀; all of the M&V team observed leakages were lower than those values reported where a discrepancy greater than 10 percent was observed. The adjustments made based on on-site observations for this measure resulted in a net increase in the site visit realization rate.

D. Documentation

Documentation was requested for a total of 43 sites through the supplemental data request. Of these sites, documentation was provided for 43, all of which 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.



9. Impact Evaluation Results—Texas New Mexico Power Company...

9.3.3 High-Performance Homes MTP Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
7.9%	757	757	100.0%	5.3%	907,081	907,081	100.0%	Good

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 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 one Excel file with select baseline home data and one Excel file with the exact same as-built home data, as well as an AHRI Certificate and a REM/Rate file. The EM&V team also received a copy of the program manual. This information contained critical inputs to calculating savings to allow for comparison and to verify energy savings and incentive payouts.

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

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



9. Impact Evaluation Results—Texas New Mexico Power Company...

9.3.4 Low Income Weatherization Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
2.8%	266	263	99.0%	2.7%	454,095	446,739	98.4%	Good

Completed Desk Reviews*	On-site M&V
48	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.

Evaluated savings for the TNMP Low Income Weatherization program were 263 kW and 446,739 kWh, with realization rates of 99 percent and 98 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

A. Data review

The data review realization rates are 101 percent for both energy and demand 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.



9. Impact Evaluation Results—Texas New Mexico Power Company...

The data review realization rate is very close to 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 several factors.

Legacy deemed savings values. The team determined that the data review realization rates were influenced by application of deemed savings from petition 27903 for installations of ENERGY STAR® refrigerator measures. These deemed savings values have been superseded by petition 38025, which is the basis for refrigerator savings in TRM V1.0. Savings for these measures account for 3 percent of evaluated energy savings and 1 percent of demand savings for the TNMP Low Income Weatherization program and therefore do not greatly influence this program's realization rate.

Air infiltration eligibility requirements. While TRM V1.0 contains several eligibility requirements for the infiltration reduction measure, low-income programs are exempt from these requirements. The TRM applies a cap of 4.0 CFM₅₀ per square foot to the pre-treatment infiltration against which contractors can claim savings.

In this program, application of this requirement in the ex-ante savings calculation led to differences between the reported and evaluated savings values for two projects. 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. 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.

B. Desk review

Desk reviews were completed for 48 projects, and resulted in desk review realization rates of 100 percent for both energy and demand savings. No discrepancies were identified by the EM&V team through this review.

C. Site visits

Site visits were conducted for five projects, resulting in site visit realization rates of 97 percent and 98 percent for energy and demand savings, respectively. All of the visited sites received desk reviews.

Air infiltration improvements. Through the site review process, the EM&V team identified differences in the values used to calculate savings for air infiltration reduction measures. Due to the nature of blower door tests, some variation is expected. For infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data values collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.



9. Impact Evaluation Results—Texas New Mexico Power Company...

A discrepancy beyond ± 10 percent was noted for the one home that received a site visit after air sealing was performed. The team observed a post-treatment leakage of 118 CFM₅₀ below the value reported. At this home, the heating equipment type reported in the tracking database, an electric resistance furnace, was also found to differ from the heat pump observed on-site. The adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

Ceiling insulation. One site that received ceiling insulation showed a discrepancy between the observed and reported heating equipment type serving the home. At this site, the team verified that a heat pump was installed rather than an electric resistance furnace indicated in the tracking data. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

D. Documentation

Documentation was requested for a total of 48 sites through the supplemental data request. Of these sites, documentation was provided for 48, all of which 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.

9.4 DETAILED FINDINGS—LOAD MANAGEMENT

9.4.1 Load Management Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
41.6%	3,993	3,973	99.5%	0.0%	7,945	7,945	100.0%	Good

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 PY2014 evaluation activities found that the individual participant load impact calculations in the work papers supplied to the EM&V Team were the same as those validated by using the individual customer interval load data. There were 86 reported program participants in 2014 and this is the number of participants for which the evaluation team received work papers and interval load data. There were two events (6/19 and 9/16) called during the summer of 2014. Both events lasted for one hour.

Evaluated savings for the TNMP Load Management Program were 3,975 kW and 7,945 kWh. The realization rate for kW was 100 percent and the realization rate for kWh was also 100 percent. This discrepancy was most likely due to rounding and was of no significance.



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.

10.1 KEY FINDINGS

10.1.1 Evaluated savings

Xcel SPS’s evaluated savings for PY2014 were 5,144 for demand (kW) and 12,026,823 energy (kWh) savings. Both the kW and kWh realization rates were slightly above 100 percent.

Residential kWh savings were adjusted for some discrepancies among savings calculations, project documentation, and residential on-site M&V findings for the air infiltration reduction and duct efficiency improvement measures.

Table 10-1 shows the claimed and evaluated demand savings for Xcel SPS’s portfolio and broad customer sector/program categories for PY2014.

Table 10-1. Xcel SPS Program Year 2014 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kw)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	Realization Rate (kw)	Precision at 90% Confidence
Total Portfolio		5,019	5,144	102.5%	3.3%
Commercial Sector	38.6%	1,938	2,016	104.0%	3.6%
Residential Sector	25.7%	1,291	1,339	103.7%	11.6%
Load Management	35.6%	1,789	1,789	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 PY2014.



Table 10-2. Xcel SPS Program Year 2014 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2014 Claimed Demand Savings (kWh)	2014 Evaluated Demand Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		11,900,129	12,026,823	101.1%	5.5%
Commercial Sector	59.3%	7,061,773	7,321,454	103.7%	3.5%
Residential Sector	40.6%	4,829,285	4,696,298	97.2%	12.9%
Load Management	0.1%	9,071	9,071	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. Program-level results should only be used to provide insight into how individual programs are affecting the overall portfolio realization rates.**

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 limited kW program documentation score and a limited kWh program documentation score for PY2014. As program documentation recommendations from the PY2012 EM&V effort are to come into effect in PY2014, the EM&V team did expect program documentation scores to improve between PY2012 and PY2014.

10.1.2 Cost-effectiveness results

Xcel SPS’s overall portfolio had an evaluated cost-effectiveness of 2.78, or 3.11 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 Low-Income Weatherization.

The lifetime cost of PY2014 evaluated savings was \$0.01 per kWh and \$15.72 per kW.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

Table 10-3. Xcel SPS Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Gross Savings Results	Evaluated Net Savings Results
Total Portfolio	2.72	2.78	2.35
Total Portfolio excluding low-income programs	3.05	3.11	2.62
Commercial Sector	3.82	3.97	3.28
Large Commercial SOP	4.52	4.73	3.86
Small Commercial SOP	4.92	5.08	4.12
Retro-commissioning MTP	1.80	1.80	1.62
Residential Sector	2.59	2.58	2.22
Residential SOP	2.78	2.77	2.16
Hard-to-Reach SOP	2.31	2.30	2.30
Low-Income	1.59	1.52	1.52
Low Income Weatherization	1.59	1.52	1.52
Load Management	1.01	1.01	1.01
Load Management SOP	1.01	1.01	1.01

10.2 DETAILED FINDINGS—COMMERCIAL

10.2.1 Commercial Standard Offer Program

A. Commercial Standard Offer

Type	Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
Large	30.6%	1,534	1,603	104.5%	42.6%	5,068,854	5,306,207	104.7%	Limited
Small	3.7%	188	197	104.5%	6.7%	797,420	819,748	102.8%	Limited

Type	Completed Desk Reviews*	On-site M&V
Large	20	10
Small	5	3

*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.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

Evaluated energy savings for the Xcel Commercial SOP were slightly higher than claimed energy savings, with a realization rate of 105 percent for the Large SOP and 103 percent for Small SOP. Evaluated demand savings were also higher than the claimed demand savings taken from the program tracking system, with a realization rate of 105 percent.

The PY2014 CSOP evaluation 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 project-specific savings adjustments that were the major drivers of the program level realization rate are listed below by Project ID:

Project ID #690921: This project involved lighting upgrades and VSD retrofits on air handler units, chilled water loops, and exhaust fans. During the desk review, it was found that the ex-ante VSD savings were claimed using a custom calculation method rather than the deemed method prescribed in the TRM. This custom calculation claimed a 50 percent reduction in motor run-time hours but did not provide any documentation to back up the claim. As no documentation was provided for the reduction in motor operation, the EM&V team changed the project calculation algorithm to match deemed calculation methods from the TRM. Additionally, the savings for the chilled water loop and the exhaust fans were zeroed out, as a deemed savings approach is not prescribed in the TRM for these, and there was no supporting documentation provided to support the ex-ante savings claim. The use of a custom calculator is an acceptable method if there is documentation of why it is being used and how the values are being calculated. These updates to the project savings methodology resulted in a 64 percent realization rate for energy and a 111 percent realization rate for demand savings. As evident from the reason for the savings gap above, the site had insufficient documentation, the lack of completeness of which caused the calculation method to be changed to a deemed calculation method. This site did not receive an on-site M&V visit.

Project ID #690940: During the on-site visit, the EM&V team found differences in the building type and the measure application type, and an incorrect version of the calculation tool was used. The building type for the lighting measures was reported to be “Education, Summer” in the ex-ante documentation. However, the on-site verification found it to be “Education K-12, No summer.” Additionally, HVAC retrofits recorded as early replacement were judged to be capacity expansion due to the large differences between the total pre- and post-retrofit capacities of the units. Finally, the HVAC calculation tool used was an older version that referenced out-of-date energy and demand coefficients; these were recalculated with the 2013 calculator. These updates to the project savings methodology resulted in a 114 percent realization rate for energy savings and a 126 percent realization rate for demand savings for the on-site verification. The same HVAC findings were implemented in the desk review process, resulting in a 125 percent realization rate for energy and a 134 percent realization rate for demand in the desk review.

Project ID #722637: During the on-site M&V visit, the EM&V team found an error in the fixture configuration of the installed lighting for this project. The Ex Ante calculations listed all installed fixtures as 10 lamp T5 fixtures. The EM&V team found that there was a mixture of 8, 10 and 12 lamp T5 fixtures installed as part of the project and made appropriate adjustments to the calculations. The resulting evaluated on-site energy



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

realization rate for this project is 104 percent with a demand savings realization rate of 104 percent.

Project ID #746692: Per the desk review findings, the EM&V team found that the retrofit equipment had different capacities and efficiencies than what were listed in the calculations. Six 2-ton units were changed to 3-ton units based on specification sheets and the efficiencies for a 2.5-ton unit and a 7.5-ton unit were incorrect. Adjusting for these discrepancies resulted in a 96 percent realization rate for energy and a 98 percent realization rate for demand in the desk review. This site did not receive an on-site M&V visit.

As part of the PY2012 evaluation report, 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 14 out of the 25 (56 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 building types, equipment quantities, and equipment specifications (wattages, efficiencies, ballast factors, etc.). Because sufficient documentation was provided for less than 70 percent of the projects in the sample, the EM&V team assigned a program documentation score of limited for the Xcel Energy CSOP PY2014 projects.

In addition to the program documentation recommendations in the PY2012 report, the EM&V team also recommended that the utility should include information on the end uses affected by measure installations as well as detailed measure descriptions for all of the sites and line items entered into the tracking system. The recommendation appears to have not been implemented, as the tracking data only provides details on the calculator type. In addition to the calculator type, it would be useful to provide details on end uses, broken down into the following categories: Lighting, HVAC, Building Envelope, Food Service Equipment, Refrigeration, and Miscellaneous, which will be consistent with the Texas TRM. Additional measure-level details should also be provided, at a minimum, consistent with the TRM measure sub-categories.

There was only one project, among the five total sites reviewed, where the evaluated savings differed from the claimed savings. This site is listed below by Project ID:

Project ID #690938: During the on-site M&V visit, the EM&V team determined that the incorrect building type was used for the deemed hours of operation. The ex-ante calculations split the lighting into Education areas and Custom 24 hours-of-operation security areas. The EM&V team reverted the building type back to “Education K-12, No summer” for all areas. It must be noted that the TRM prescribed hours of operation per building type is representative of all lighting types installed at the facility and takes into account the operation of security fixtures. Based on these adjustments, the evaluated on-site energy realization rate for this project is 86 percent, with a demand savings realization rate of 93 percent.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

10.2.2 Retro-commissioning Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
4.3%	216	216	100.0%	10.0%	1,195,499	1,195,499	100.0%	Good

Completed Desk Reviews*	On-site M&V
1	1

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

Evaluated savings for the Retro-Commissioning MTP were equal to the claimed savings, with realization rates of 100 percent for both demand and energy. As only one project was claimed in PY2014, the evaluation performed a desk review and onsite survey for a census of all measures claimed. There were no adjustments to any of the savings calculations.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for the one site that had a desk review 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.

10.3 DETAILED FINDINGS—RESIDENTIAL

10.3.1 Residential Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
14.7%	740	774	104.6%	25.0%	2,978,606	2,905,420	97.5%	Good

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



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

Evaluated savings for the Xcel SPS Residential SOP were 774 kW and 2,905,420 kWh, with realization rates of 105 percent and 98 percent, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

A. *Data review*

The data review realization rates are 100 percent for both energy and demand 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 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, 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 26 projects, and resulted in desk review realization rates of 97 percent and 98 percent for energy and demand 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 three of the projects. The team noted the following transcription errors:

- One project classified a heat pump as a central air conditioning unit. This resulted in an increase in energy savings, but a decrease in the demand realization rate.
- Another project classified a central air conditioner as a heat pump. This resulted in a decrease in both energy and demand realization rates.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

- For one project claiming duct sealing savings, the reported heating type recorded in the tracking database did not reflect that found in the project documentation. This resulted in a decrease in the energy realization rate.

C. Site visits

Site visits were conducted for 10 projects, resulting in site visit realization rates of 101 percent and 106 percent for energy and demand savings, respectively, rounded to the nearest percentage point. All of the visited sites received desk reviews.

Through the site review process, the EM&V team identified differences only in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is expected to be within ± 20 percent using a Duct Blaster test; for infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team applied data collected during site visits to the estimation of savings after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Discrepancies beyond ± 20 percent were noted for four of the seven duct improvement projects. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 29 CFM₂₅; however, the M&V team observed leakages both higher and lower than those values reported. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

Air infiltration improvements. Discrepancies beyond ± 10 percent were noted for four of the five homes that received a site visit after air sealing was performed. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 1,554 CFM₅₀; all of the M&V team observed leakages that deviated by more than 10 percent were lower than those values reported. In two cases where M&V field staff measured infiltration levels significantly below those recorded in the tracking database, they noted that separate envelope measures had been performed in these homes, and that the leakage in the tracking system appeared large for homes of recent vintage. Overall, the adjustments made based on on-site observations for this measure resulted in a net increase in the site visit realization rate.

D. Documentation

Documentation was requested for a total of 28 sites through the supplemental data request. Of these sites, documentation was provided for 26, all of which 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.



10.3.2 Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
8.9%	447	469	104.9%	12.7%	1,516,815	1,472,372	97.1%	Good

Completed Desk Reviews*	On-site M&V
37	9

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

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 Xcel SPS Hard-to-Reach SOP were 469 kW and 1,472,372 kWh, with realization rates of 105 percent and 97 percent, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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

A. Data review

The data review realization rates are 100 percent for both energy and demand 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.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

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.

Air infiltration eligibility requirements. TRM V1.0 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.¹⁴ For homes where the initial leakage exceeds 4.0 CFM₅₀ 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 Xcel Hard-to-Reach Standard Offer Program, four projects reported positive ex-ante savings where infiltration levels remained within 10 percent of the initial cap post-retrofit. The team did not assign ex-post savings for these projects, resulting in a small decrease 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 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.

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 for 13 CFL projects where per-lamp savings appeared to be slightly understated. 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.

B. Desk review

Desk reviews were completed for 37 projects, and resulted in desk review realization rates of 100 percent for both energy and demand savings, rounded to the nearest percentage point. The EM&V team identified minor discrepancies between the tracking system data and the supporting documentation, leading to differences in calculated savings for two of the projects. The team noted the following transcription errors:

¹⁴ 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.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

- The pre-treatment duct leakage value (i.e., CFM) in the tracking database did not match the value in the project documentation for one project. This resulted in a minor increase in the realization rate.
- For one project, the quantity of CFLs reported did not align with that found in the project documentation. This resulted in a minor decrease in the realization rate.

C. Site visits

Site visits were conducted for nine projects, resulting in site visit realization rates of 97 percent and 105 percent for energy and demand savings, respectively. All of the visited sites received desk reviews.

Through the site review process, the EM&V team identified differences in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. Due to the nature of blower door and Duct Blaster tests, some variation is expected. For duct improvement measures, variation in measured post-retrofit leakage is expected to be within ± 20 percent using a Duct Blaster test; for infiltration measures, variation within ± 10 percent is expected for blower door test results.

For projects with a large variation in ex-post and ex-ante savings, the evaluation team reviewed all data, notes, and pictures collected, and discussed with the M&V team. The evaluation team kept data collected during site visits in the analysis after confirming that the test was performed properly and that the auditor found no visible indicators that would cause an inaccurate reading. Site-specific details are provided where available.

Duct improvements. Discrepancies beyond ± 20 percent were noted for three of the six duct improvement projects. In cases where discrepancies were noted, the team observed differences in post-treatment leakage of up to 364 CFM₂₅; however, the M&V team observed leakages both higher and lower than those values reported. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

Air infiltration improvements. Discrepancies beyond ± 10 percent were noted for four of the seven homes that received a site visit after air sealing was performed, while the infiltration level in one of the remaining homes could not be verified during the site visit due to uniquely-configured ductwork that may have led to inconsistent testing, and therefore measured leakage from this site was not included in the analysis. The team observed differences in post-treatment leakage of up to 1,747 CFM₅₀; however, the M&V team observed leakages both higher and lower than those values reported. Overall, the adjustments made based on on-site observations for this measure resulted in a net increase in the site visit realization rate.

CFL installation. Discrepancies were also noted for one site where CFLs were reported to have been installed. The customer informed M&V field staff that CFLs had not been provided to them through the program. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

D. Documentation

Documentation was requested for a total of 38 sites through the supplemental data request. Of these sites, documentation was provided for 37, all of which 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.

10.3.3 Low-Income Weatherization

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
2.1%	104	96	92.2%	2.8%	333,864	318,506	95.4%	Good

Completed Desk Reviews*	On-site M&V
26	3

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

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 Xcel SPS Low-Income Weatherization program were 96 kW and 318,506 kWh, with realization rates of 92 percent and 95 percent, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three 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
- Site visit review, to check that measure data existing in the home is as recorded on the forms.

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- and on-site-verification-based adjustments to the data review savings are analogous to the utility modifications.

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



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

A. Data review

The data review realization rates are 101 percent for both energy and demand 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 101 percent, rounded to the nearest percentage point, 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.

Legacy deemed savings values. The team determined that the data review realization rates were influenced by application of deemed savings from petition 27903 for installations of ENERGY STAR® refrigerator measures. These deemed savings values have been superseded by petition 38025, which is the basis for refrigerator savings in TRM V1.0. Nevertheless, savings for this measure account for 1 percent of evaluated energy and demand savings for the Xcel SPS Low-Income Weatherization program, and therefore do not greatly influence this program's realization rate. The overall effect was an increase in the realization rate.

Air infiltration eligibility requirements. While TRM V1.0 contains several eligibility requirements for the infiltration reduction measure, low-income programs are exempt from these requirements. The TRM applies a cap of 4.0 CFM₅₀ per square foot to the pre-treatment infiltration against which contractors can claim savings.

In this program, application of this requirement in the ex-ante savings calculation led to differences between the reported and evaluated savings values for two projects. 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 differences. All identified variations due to rounding were within 1 kWh and 0.001 kW.

B. Desk review

Desk reviews were completed for 26 projects, and resulted in desk review realization rates of 100 percent for both energy and demand savings, rounded to the nearest percentage point. No discrepancies were identified by the EM&V team through this review.

C. Site visits

Site visits were conducted for three projects, resulting in site visit realization rates of 95 percent and 91 percent for energy and demand savings, respectively. All of the visited sites received desk reviews.

Through the site review process, the EM&V team identified a difference in the ceiling insulation measure installed through one project.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

For this project, M&V field staff measured the square footage of installed ceiling insulation to be 11 percent lower than that recorded in the data tracking system for this customer. Overall, the adjustments made based on on-site observations for this measure resulted in a net decrease in the site visit realization rate.

D. 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 percent of the sampled sites, the program documentation score for these estimates is good.

10.4 DETAILED FINDINGS—LOAD MANAGEMENT

10.4.1 Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2014 Claimed Demand Savings (kW)	2014 Evaluated Demand Savings (kW)	2014 Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2014 Claimed Energy Savings (kWh)	2014 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Program Documentation Score
35.6%	1,789	1,789	100.0%	0.1%	9,071	9,071	100.0%	Good

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 PY2014 evaluation activities found that the individual participant load impact calculations in the work papers were the same as those validated by using the individual customer interval load data. There were 11 reported program participants in 2014 and this is the number of participants for which the evaluation team received work papers and interval load data. There were two events (7/22 and 8/13) called during the summer of 2014. The first event lasted for three hours and the second event lasted for two hours.

Evaluated savings for the Xcel Load Management Standard Offer Program were 1,789 kW and 9,071 kWh. The realization rate for kW and kWh was 100 percent for this program.