



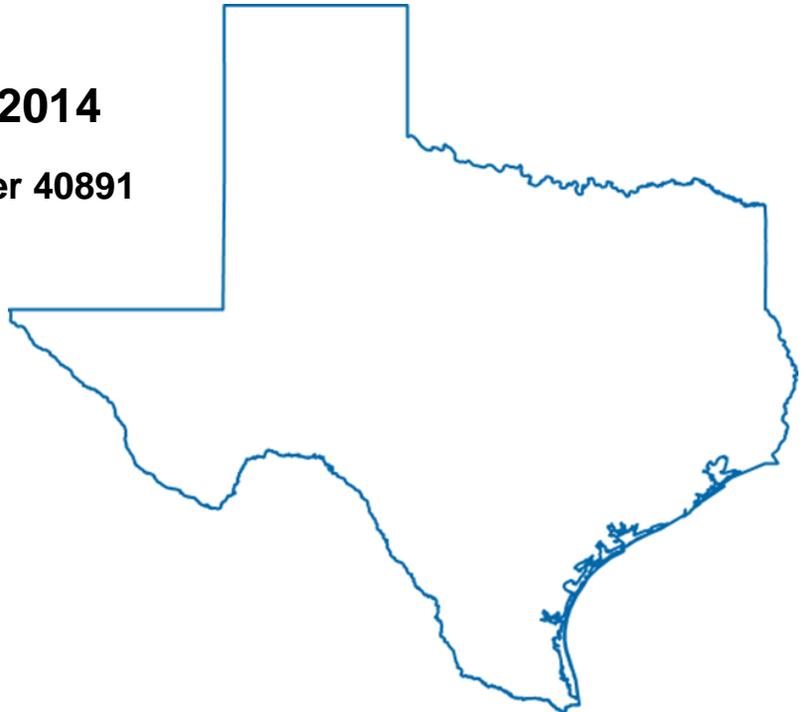
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Public Utility Commission of Texas

Annual Statewide Portfolio Report for Program Year 2013—Volume II

October 6, 2014

Project Number 40891



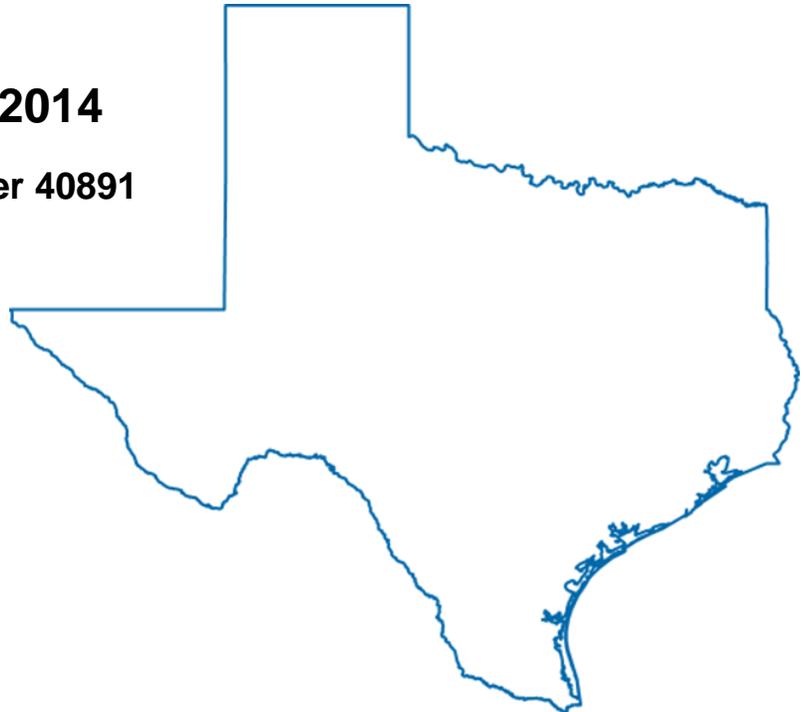


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Acronyms

AEP TCC	American Electric Power Texas Central Company
AEP TNC	American Electric Power Texas North Company
C&I	Commercial and Industrial
CNP	CenterPoint Energy Houston Electric, LLC
DI	Direct Install
ECM	Energy Conservation Measure
EEPR	Energy Efficiency Plan and Report
Entergy	Entergy Texas, Inc.
EPE	El Paso Electric Company
ESNH	ENERGY STAR® New Homes
EM&V	Evaluation, Measurement, and Verification
kW	Kilowatt
kWh	Kilowatt Hour
HPwES	Home Performance with ENERGY STAR
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
PY	Program Year
QA/QC	Quality Assurance/Quality Control
RFP	Request for Proposals
Sharyland	Sharyland Utilities, L.P.
SOP	Standard Offer Program
Xcel SPS	Southwestern Public Service Company (subsidiary of Xcel Energy)
SWEPCO	Southwestern Electric Power Company
TNMP	Texas New Mexico Power Company
TRM	Technical Reference Manual



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 PY2013 were slightly higher than claimed savings resulting in healthy realization rates over 100 percent for both demand (kW) and energy (kWh) savings.

The realization rates were over 100 percent primarily due to the residential sector evaluated savings and most specifically the evaluated savings for the Hard-to-Reach (HTR) Standard Offer Program (SOP), which had over 170 percent and 140 percent realization rates for kWh and kW, respectively. The Residential SOP program also resulted in a kWh realization rate of nearly 150 percent. These higher realization rates were mostly driven by adjustments to claimed energy and peak savings to be consistent with TRM 1.0. In particular, the duct sealing measures were not updated using the winter peak demand savings calculation. In addition, adjustments were made to savings based on differences in values for air infiltration and duct efficiency improvements.

The commercial programs generally resulted in realization rates at or above 100 percent. One exception was Commercial SOP, which reported realization rates in the lower 90 percent range. On-site visits identified issues with occupancy sensors, which was the primary contributor to the lower realization rate. The Commercial SOP also made adjustments to HVAC retrofit measures based on on-site visits that resulted in +/- 5 percent savings for that project.

The EM&V team also made minor adjustments to the other commercial market transformation programs based on onsite M&V findings. Although these adjustments both increased and decreased project-level savings, the overall realization rates for the commercial market transformation programs was above 100 percent.

The New Homes realization rates varied from 99 percent to 143 percent based on project reviewed. The variance tends to correlate by builder which indicates variations in how builders treat REM/Rate inputs.

Table 1-1 shows the claimed and evaluated demand savings for AEP TCC's portfolio and broad customer sector/program categories for PY2013.



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

Table 1-1. AEP TCC Program Year 2013 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kw)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kw)	Precision at 90% Confidence
Total Portfolio		34,136	34,819	102.0%	4.2%
Commercial Sector	18.2%	6,227	6,543	105.1%	8.5%
Residential Sector	27.7%	9,455	9,820	103.4%	13.6%
Load Management*	53.4%	18,217	18,217	100.0%	0.0%
Pilots	0.7%	237	237	100.0%	0.0%

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

Table 1-2 shows the claimed and evaluated energy savings for AEP TCC’s portfolio and broad customer sector/program categories for PY2013.

Table 1-2. AEP TCC Program Year 2013 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		48,954,289	56,844,575	116.1%	9.7%
Commercial Sector	48.8%	23,896,937	23,686,807	99.1%	14.9%
Residential Sector	49.1%	24,050,327	32,150,742	133.7%	13.1%
Load Management*	0.3%	126,525	126,525	100.0%	0.0%
Pilots	1.8%	880,501	880,501	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 qualitative rating of low, medium, and high associated with the uncertainty of the verification effort based on program documentation received from the utility. The most favorable rating for uncertainty of “low” was given when thorough and detailed documentation was received to verify the savings. The “high” uncertainty rating was given when the EM&V team received primarily project-level savings calculations without supporting documentation to verify the inputs in the calculations. It is important to note that this uncertainty rating is specific to program documentation



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

received to verify claimed savings and is not an indicator of the reasonableness or accuracy of savings estimates.

Based on these uncertainty rankings, the sufficiency of program documentation provided to the EM&V team to complete a third-party due diligence review of evaluated demand savings is indicated as good, fair, or limited. For the utility program documentation score, the ranking of “good” was given if 90 percent or more of the evaluated savings estimates received a ranking of low or medium uncertainty due to program documentation received as indicated in detailed program findings. A ranking of “fair” was given if 70 percent–89 percent of the evaluated savings estimates received a ranking of low or medium. A ranking of “limited” was given if less than 70 percent of savings received an uncertainty ranking of low or medium. In general, a ranking of “good” indicates the utility has established processes to collect sufficient documentation to verify savings; a ranking of “fair” also indicates established processes with some areas of improvements identified; and a ranking of “limited” indicates program documentation improvements across more individual programs and/or high savings programs have been identified. AEP TCC received a good kW program documentation score and a fair program documentation score for PY2013. As program documentation recommendations from 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 PY2013.

1.1.2 Cost-effectiveness results

AEP TCC’s overall portfolio had a cost-effectiveness of 3.55, or 3.88 excluding low-income programs.

The more cost-effective programs were Commercial SOP, Commercial Solutions MTP, SCORE/CitySmart MTP, Residential SOP, and Hard-to-Reach SOP, all with a benefit-cost ratio over 5.0. The less cost-effective programs were SMART Source Solar PV, CoolSaver A/C Tune-up MTP, and Irrigation Load Management MTP.

The Irrigation Load Management MTP was the only active program that did not pass cost-effectiveness. The low cost-effectiveness score for the Irrigation Load Management MTP reflects the minimal savings reported against the incentives paid out through the program. The Nonresidential A/C Distributor Pilot program had a cost-effectiveness ratio of 0 because there were no participants, although some costs were spent on developing the program.

The lifetime cost of PY2013 evaluated savings was \$0.016 per kWh and \$13.06 per kW.

Table 1-3. AEP TCC Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Total Portfolio	3.10	3.55
Total Portfolio excluding low-income programs	3.40	3.88
Commercial Sector	4.17	4.17
Commercial SOP	5.53	5.12
Commercial Solutions MTP	7.17	7.26
CoolSaver A/C Tune-up MTP (Nonresidential)	1.44	1.44



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

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
SCORE/CitySmart MTP	4.90	5.34
Open MTP	2.33	2.32
SMART Source Solar PV MTP (Nonresidential)	1.23	1.23
Residential Sector	3.38	4.33
Residential SOP	4.50	5.56
Hard-to-Reach SOP	3.27	5.43
CoolSaver A/C Tune-up MTP (Residential)	1.66	1.66
High-performance New Homes MTP	1.59	1.59
SMART Source Solar PV MTP (Residential)	1.08	1.08
Low-Income	1.00	1.34
Targeted Low Income Energy Efficiency Program	1.00	1.34
Load Management	0.94	0.94
Load Management SOP	1.68	1.68
Irrigation Load Management MTP	0.05	0.05
Pilots	1.89	1.89
A/C Distributor Pilot MTP (Nonresidential)	0.00	0.00
A/C Distributor Pilot MTP (Residential)	2.23	2.23

1.2 DETAILED FINDINGS—COMMERCIAL

1.2.1 Commercial Standard Offer Program

A. Commercial Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
5.7%	1,963	1,837	93.6%	16.4%	8,031,113	7,420,749	92.4%	HIGH



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

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
20	7	7	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.

The evaluated realization rates were driven by adjustments made during the desk review and on-site verification process. The evaluation review process resulted in adjusted realization rates for 12 projects. These adjusted realization rates ranged from 0 percent to 102 percent for both energy and demand. From the 12 projects with adjusted realization rates, eight projects were found to be major drivers for the lower evaluated realization rates, which 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. As documented below, one of the primary drivers for reducing the realization rate was related to occupancy sensors. For five of the projects where on-sites were completed, evaluation found that the occupancy sensors were not installed as reported in the savings calculator. We recommend the program implementers ensure that post verification visits confirm these installations in addition to the lighting fixture installations.

Project ID #392460, #392462, #392464 & #392468: These projects involved lighting and controls retrofits. During the on-site verification for the projects, the EM&V Team verified that no occupancy sensor lighting controls installed as reported in the project calculator savings, and the site contacts confirmed that they were never installed. Several of these sites also found some differences in fixture types than what was reported. Therefore, the evaluated savings were adjusted, and the project energy and demand realization rate recalculated to the following:

- Project ID #392460: 95 percent for both energy and demand.
- Project ID #392462: 94 percent for energy and 95 percent for demand.
- Project ID #392464: 85 percent for energy and 87 percent for demand.
- Project ID #392468: 95 percent for energy and 96 percent for demand.

Project ID #392466: During the on-site verification, the evaluation team found several issues related to the HVAC measures installed at the facility involved the quantity of units and the efficiency of the units installed. Evaluators found that the HVAC units retrofitted were less than reported in the savings calculator. Additionally, the efficiencies of many of the installed units did not exceed the current standard efficiency, so no savings were credited for those units. For the lighting retrofit, occupancy sensors were reported to be installed in the savings calculator, but were not found onsite. These changes resulted in an adjustment to the reported savings, and this site received a realization rate of 93 percent for energy and 94 percent for demand.

Project ID #616714: The project involved the retrofit of Metal Halide lighting with 54W T5 fixtures, controlled by occupancy sensors. During the desk review, the pre- and post-inspection reports were reviewed, and the evaluators found that 12 fewer fixtures had been retrofitted than reported. The savings for this project were adjusted, resulting in an



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

energy and demand realization rate of 90 percent. No on-site verification was performed at this site.

Project ID #392461 & #392465: Based on the evaluation review, these project savings claims were found to be incorrect. These customers implemented multiple projects and these savings claims were found to be incorrect since there was no calculator or documentation in support of this claim. Therefore, the realization rate for these projects was set as 0 percent for both energy and demand.

Table 1-4. CSOP Documentation Quality Assessment

Sufficient Documentation	Insufficient Documentation	No Documentation	Completed Desk Reviews
11	4	5	20

As shown in the table above, the documentation provided for the AEP TCC CSOP was sufficient for only 55 percent of the projects that were reviewed. Without adequate documentation, the EM&V Team was not able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (wattages, efficiencies, ballast factors, etc.). Therefore, documentation for the AEP TCC CSOP evaluation has been assigned an uncertainty rating of HIGH, as they have provided sufficient documentation for less than 70 percent of the projects in the sample.

1.2.2 Commercial Market Transformation Programs

A. Commercial Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
2.5%	838	838	100.1%	9.6%	4,722,842	4,789,907	101.4%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
13	5	3	13

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

Evaluated savings for the Commercial Solutions MTP were 838 kW and 4,789,907 kWh, with realization rates of 100 percent and 101 percent for demand and energy savings, respectively.

The realization rate for the Commercial Solutions MTP was mainly driven by savings adjustments from onsite survey results.

Site #161074: The HVAC equipment age was determined based on onsite findings which improved the baseline unit efficiency resulting in overstated project savings. The



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change in savings resulted in decreased savings (site #161074 kWh and kW realization rate = 83 percent).

Site #160898: Lighting fixture quantity was corrected from onsite findings resulting in slightly overstated project savings. The change in savings resulted in slightly decreased savings (site #160898 kWh and kW realization rate = 100.3 percent).

Site #160883: The lighting fixture quantity was corrected from onsite findings resulting in overstated project savings. The change in savings resulted in decreased savings (site #160883 kWh and kW realization rate = 96 percent).

Site #211062: The onsite survey found the post equipment efficiency of the HVAC unit to be higher than reported resulting in understated project savings. The change in savings resulted in increased savings (site #211062 kWh and kW realization rate = 116 percent).

Site #113039: The onsite survey found the post equipment efficiency of the HVAC unit to be higher than reported resulting in understated project savings. The change in savings resulted in increased savings (site #113039 kWh and kW realization rate = 108 percent).

Site #211144: Three updates were made based on onsite findings including corrections to the building type, changes to the air conditioning type for two lighting fixture types (electric to medium temperature refrigeration), and updates to one fixture type resulting in understated energy and overstated demand project savings. The change in savings resulted in increased energy and slightly decreased demand savings (site #211144 kWh realization rate = 149 percent and kW realization rate = 99.6 percent).

Site #211488: Additional retrofit lighting fixtures were identified during the onsite survey resulting in understated project savings. The change in savings resulted in increased savings (site #211488 kWh realization rate = 299 percent and kW realization rate = 289 percent).

The EM&V team was not able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for 1 of the 13 sites that had desk reviews completed because insufficient documentation was provided for the site. In particular, AEP-TCC did not provide the EM&V team with the requested post inspection field notes and the invoice did not include make and model numbers for the lighting fixtures. For this site, we were unable to verify the fixture types. Since sufficient documentation was provided for 92 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

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

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
2.9%	997	997	100.0%	5.1%	2,472,811	2,472,811	100.0%	LOW



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Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
4	2	2	0

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

Evaluated savings for AEP TCC’s CoolSaver A/C Tune-Up 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.

Similar to PY2012 findings, the EM&V team found 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. These tasks may have been performed, but supporting documents did not clearly indicate whether this was done. 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 uncertainty ranking for these estimates is LOW.

C. SCORE/CitySmart Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
5.3%	1,806	2,248	124.5%	12.5%	6,113,215	6,446,385	105.5%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
5	10	2	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.



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Evaluated savings for the SCORE/CitySmart MTP were 2,248 kW and 6,446,385 kWh, with realization rates of 125 percent and 106 percent for demand and energy savings, respectively.

The realization rate for the SCORE/CitySmart MTP was driven by savings adjustments from onsite survey and desk review results.

Site #161101: Lighting fixture type and quantity was corrected from onsite findings in addition to corrections from multiple building types to the predominant building type, which resulted in overstated project savings. The change in savings resulted in decreased savings (site #161101 kWh realization rate = 92 percent and kW realization rate = 89 percent).

Site #161090: Lighting fixture quantity and type was corrected from onsite findings resulting in overstated project savings. The change in savings resulted in decreased savings (site #161090 kWh and kW realization rate = 93 percent).

Site #112152: The onsite survey found the post equipment efficiency of the chiller to be higher than reported resulting in understated project savings. The change in savings resulted in increased savings (site #112152 kWh realization rate = 859 percent and kW realization rate = 860 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for all 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 uncertainty ranking for these estimates is LOW.

D. Open Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
1.6%	533	533	100.0%	4.9%	2,382,363	2,382,363	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
5	0	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.

Evaluated savings for the Open MTP were 533 kW and 2,382,363 kWh, with realization rates of 100 percent for demand and energy savings. 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 all five sites that had desk reviews completed because sufficient documentation was provided for the sites. In order to receive sufficient documentation, the



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EM&V team went back to the implementation contractor and requested additional documentation beyond what was initially provided, specifically the customer proposals and inspection summary files for all projects. Since sufficient documentation was provided for 100 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

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

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.3%	91	91	100.0%	0.4%	174,592	174,592	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
4	2	1	0

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

Evaluated savings for the PV/Solar Pilot MTP (Nonresidential) were 91 kW demand and 174,592 kWh annual energy, with realization rates of 100 percent.

Evaluated savings matched claimed or reported savings from program administrators exactly; evaluation activities found no evidence of differences between installed and tracked system capacity. This finding was based on our desk reviews of four installations. Evaluated savings adjustments 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 LOW.



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1.3 DETAILED FINDINGS—RESIDENTIAL

1.3.1 Residential Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
17.4%	5,935	5,577	94.0%	30.1%	14,728,937	19,545,299	132.7%	MEDIUM

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
33	20	8	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.

Evaluated savings for the Residential SOP were 5,577 kW and 19,545,299 kWh, with realization rates of 94 percent and 133 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

A. Data review

The data review realization rates are 164 percent for kWh and 114 percent for kW. The EM&V team used the deemed savings reflected in TRM version 1.0 volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722¹). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation. The impact of this difference is a realization rate of 192 percent for energy and 122 percent for demand. This is the largest driver of the program's data review realization rate.

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement) based on Project No. 41722. However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the table

¹ Petition to approve revisions to residential deemed savings to incorporate winter peak demand impacts and update certain existing deemed savings values.



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below.² These assumptions result in a conservative estimate of savings as they are generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (262 percent for kWh and 320 percent for kW), these measure comprise a small percentage (<1 percent) of the total program savings, so the overall impact on the program’s realization rate is minimal.

Table 1-5. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, ceiling insulation, and wall insulation.

Additionally, there were seven infiltration reduction projects where the 10 percent minimum reduction was not achieved after accounting for the initial infiltration valued capped at four times the home square footage. No evaluated savings were reported for these projects.

B. Desk review

The EM&V team identified discrepancies in two measures through this process: air infiltration reductions and duct efficiency improvements. In one project, air infiltration inputs did not match between the provided documentation and the tracking database; this was due to differences in the recorded pre-retrofit and post-retrofit air leakage, and differences in the recorded square footage. In two projects, the heating system type used to calculate savings for duct efficiency improvements differed between the program tracking data and project documentation.

² These assumed values were provided by Frontier.



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C. Site visits

Site visits were conducted for ten projects.³ 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, natural 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.

Discrepancies beyond 20 percent were noted for all of the eight homes that received a site visit after duct improvements were performed. In cases where discrepancies were noted, the site-visit-measured leakage was 33 percent lower to 313 percent higher than reported. For one site, the post-leakage measurement was higher than the pre-leakage, indicating zero savings are realized.

Discrepancies beyond 10 percent were noted for five of the seven homes that received a site visit after air sealing was performed. In cases where discrepancies were noted, the site-visit-measured infiltration was between 39 percent lower and 33 percent higher than reported. For one site, the post-leakage measurement was higher than the pre-leakage, indicating zero savings are realized. Also for that site, the square footage measured during the site visit did not align with that recorded in the tracking database.

D. Documentation

Desk reviews were completed for 33 projects, with documentation requested for a total of 108 sites through the supplemental data request. Of these sites, documentation was provided for 108, and 87 had sufficient documentation for review. Since sufficient documentation was provided for more than 70 percent but less than 90 percent of the sampled sites, the uncertainty ranking for these estimates is MEDIUM.

1.3.2 Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh*)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
4.9%	1,665	2,346	140.9%	8.1%	3,972,378	6,928,225	174.4%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
11	12	7	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.

³ Seven of these sites had insufficient documentation to complete a desk review, as such the site visit and desk review samples were treated as independent samples rather than as nested samples.



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Evaluated savings for the AEP TCC Hard-to-Reach SOP were 2,346 kW and 6,928,225 kWh, with realization rates of 141 percent and 174 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

A. Data review

The data review realization rates are 149 percent for kWh and 107 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation. The impact of this difference is a realization rate of 194 percent for energy and 112 percent for demand. This is the largest driver of the program’s data review realization rate.

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement) based on Project No. 41722. However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the table below.⁴ These assumptions result in a conservative estimate of savings as they are generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (82 percent for kWh and 228 percent for kW), these measures comprise a small percentage (<1 percent) of the total program savings, so the overall impact on the program’s realization rate is minimal.

Table 1-6. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal

⁴ These assumed values were provided by Frontier.



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Measure	Parameter	Assumed Value
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, ceiling insulation, and CFLs.

B. Desk review

No discrepancies were identified by the EM&V team through this review.

C. Site visits

Site visits were conducted for five projects.⁵ 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, natural 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.

Discrepancies beyond 20 percent were noted for two of the three homes that received a site visit after duct improvements were performed. In cases where discrepancies were noted, the site-visit-measured leakages were 40 percent lower or 99 percent higher than reported, and the heating system type could not be verified.

Discrepancies beyond 10 percent were noted for one of the two homes that received a site visit after air sealing was performed. For this home, the site-visit-measured infiltration was 15 percent higher than reported.

Discrepancies were also noted for one other measure: ceiling insulation. For one project, the pre-retrofit R-value recorded during the site visit did not match that recorded in the tracking database, and auditors were unable to verify the heating system type and the area treated for this measure.

D. Documentation

Desk reviews were completed for 11 projects, with documentation requested for a total of 19 sites through the supplemental data request. Of these sites, documentation was provided for 19, and 18 had sufficient documentation for review. Since sufficient documentation was

⁵ Two of these sites had insufficient documentation to complete a desk review, for which a realization rate was imputed from the desk reviews for remaining projects.



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provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

1.3.3 Residential Market Transformation Programs

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

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
2.4%	828	828	100.0%	5.8%	2,835,349	2,835,349	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
2	3	2	0

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

Evaluated savings for AEP TCC’s 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.

Similar to PY2012, the EM&V team found 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. These tasks may have been performed, but supporting documents do not clearly indicate that this was done. 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 uncertainty ranking for the estimates is LOW.



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B. High-Performance New Homes Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
1.2%	402	402	100.0%	2.7%	1,318,722	1,318,722	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
8	0	6	0

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

Evaluated savings for AEP TCC’s ENERGY STAR® New Homes MTP were the same as the claimed savings; thus, realization rates for both kW and kWh are 100 percent.

The realization rates were driven by the EM&V team’s REM/Rate⁶ and DOE-2⁷ SIM file modeling activities. For PY2013, the EM&V team received program input documentation and REM/Rate and DOE-2 SIM files for sampled homes from the implementer. As a result, we were able to create a REM/Rate baseline home file and compare the sampled REM/Rate files to that base home. While the EM&V team is comfortable with the REM/Rate modeling approach, receiving the DOE-2 SIM files for each sampled home 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 eight desk reviews the EM&V team completed, we saw varying levels of realization rates ranging from 93 percent to 118 percent. The realization rate variation is a direct result of 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. There does seem to be similar variance by builder, which suggest that each Rater may treat specific REM/Rate inputs somewhat differently. We believe that there is an opportunity to closely review the REM/Rate files by Rater and to conduct training to be sure all Raters treat inputs to REM/Rate similarly. Due to sufficient documentation, the uncertainty ranking for both the kW and kWh savings is LOW.

⁶ 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).

⁷ 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/.



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

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.3%	107	107	100.0%	0.4%	205,472	205,472	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
8	1	1	0

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

Evaluated savings for the PV/Solar Pilot MTP (Residential) were 107 kW demand and 205,472 kWh annual energy, with realization rates of 100 percent.

Evaluated savings matched claimed or reported savings from program administrators exactly; the evaluation found no evidence of differences between installed and tracked system capacity. This finding was based on our desk reviews of eight 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 LOW.

1.3.4 Targeted Low-Income Energy Efficiency Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
1.5%	518	562	108.4%	2.0%	989,468	1,317,674	133.2%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
14	11	0	14

*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.



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

Evaluated savings for the AEP TCC Targeted Low-Income program were 562 kW and 1,317,674 kWh, with realization rates of 108 percent and 133 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

A. Data review

The data review realization rates are 133 percent for kWh and 111 percent for kW. This is due in part to the EM&V team using the deemed savings reflected in TRM Version 1.0 Volume 2. In particular, savings for duct sealing measures were not consistent with the TRM Version 1.0. The impact of these differences are realization rates for duct sealing of 254 percent for energy and 148 percent for demand (approximately 7 percent and 3 percent of total program energy and demand savings, respectively). Additionally, there was one instance where a similar issue occurred for ceiling insulation demand savings which had minimal impact overall.

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement). However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, for the cases where the savings were not updated to the TRM, the EM&V team estimated the savings using the assumptions as illustrated in the table below.⁸ These assumptions result in a conservative estimate of savings as they are generally reflect the minimum requirements for measure qualification. Although for these water heater measures there is a realization rate adjustment (103 percent for kWh and 105 percent for kW), these measure comprise a small percentage (<3 percent) of the total program savings, so the overall impact on the program’s realization rate is minimal.

Table 1-7. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7

⁸ These assumed values were provided by Frontier.



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

Measure	Parameter	Assumed Value
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, window AC, and refrigerators.

The largest driver of the program’s data review realization rate regard claiming savings for central AC unit installations. No savings were reported for these measure, which may be attributed to the QA/QC adjustment mentioned above. The added savings for these measures reflected 20 percent and 8 percent of the total evaluated energy and demand savings, respectively.

Additionally, there were four infiltration reduction projects where the 10 percent minimum reduction was not achieved after accounting for the initial infiltration valued capped at four times the home square footage. No evaluated savings were reported for these projects.

B. Desk review

The EM&V team identified only one discrepancy through this process—for one project, differences in SEER for central air conditioner installations were identified either through comparison with the AHRI database.

C. Site visits

Site visits were conducted for 14 projects.⁹ 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, natural 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.

Discrepancies beyond 20 percent were noted for the one home that received a site visit after duct improvements were performed. In this case where a discrepancy was noted, the site-visit-measured leakage was 35 percent higher than reported.

Discrepancies were also noted for CFLs, ceiling insulation, the installation of air conditioners, water heater measures, and solar screen measures.

- For three sites, the quantity of CFLs found during the site visits did not align with that recorded in the tracking database.

⁹ One of these sites had insufficient documentation to complete a desk review, for which a realization rate was imputed from the desk reviews for remaining projects.



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

- For one site, the initial R-value of ceiling insulation found during the site visit did not align with that recorded in the tracking database.
- For three sites, the cooling tons or SEER/HSPF of the heat pumps reported during the site visits did not align with those recorded in the tracking database.
- At one site, the SEER value for a central air conditioner reported in the tracking database did not align with that recorded on-site.
- At one site, the quantity of water heater jackets found during the site visits did not align with those recorded in the tracking database.
- At three sites, the square footage of installed screens did not match that recorded in the tracking database.

D. Documentation

Desk reviews were completed for 14 projects, with documentation requested for a total of 22 sites through the supplemental data request. Of these sites, documentation was provided for 22, and 22 had sufficient documentation for review.¹⁰ Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

1.4 DETAILED FINDINGS—LOAD MANAGEMENT

1.4.1 Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
51.9%	17,731	17,731	100.0%	0.3%	123,120	123,120	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
119	11	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 PY2013 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 119 report program participants participating in 2013 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 during 2013.

¹⁰ One of the sites received was different from that requested.



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

Evaluated savings for the AEP TCC Load Management Standard Offer program were 17,730 kW and 123,117 kWh. The very small differences between the reported and verified impacts are most likely due to rounding. One inconsistency was that the calculation of the kW impact was just for the unscheduled events, but the calculation of the kWh impact incorporated the May scheduled test event.

The realization rate for kW and kWh was 100 percent.

1.4.2 Irrigation Load Management Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
1.4%	486	486	100.0%	0.0%	3,405	3,405	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
25	0	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 program findings presented here are for the 2013 Irrigation Load Management Program. This program is new to 2013. Three events were initiated in the summer of this year. The EM&V Team verified that there were 25 customer accounts participating in the program. Events were called on three days during the summer of 2013.

Evaluated savings for the AEP TCC Irrigation Load Management Program were 486 kW and 3,405 kWh. The realization rate for kW and kWh was 100 percent; the evaluated savings matched the reported savings.



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

1.5 DETAILED FINDINGS—PILOTS

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

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.7%	237	237	100.0%	1.8%	880,501	880,501	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
4	2	5	7

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

Evaluated savings for AEP TCC’s A/C Distributor 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 a two-page tracking system printout and the Air Conditioning, Heating, and Refrigeration Institute (AHRI) Certification. This was improved documentation over what the EM&V team received in PY2012, as the PY2013 documentation included seasonal energy efficiency ratio (SEER) and tonnage information.

In PY2012, the EM&V team also received four pictures for each sampled project—one of the building/home at the site itself, one of the street sign, one of the unit, and one of the name plate information associated with that particular unit. While this type of back-up is not critical for evaluating savings, it is a best practice in project documentation. We recommend collecting pictures of each project be a continued practice moving forward.

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). As a result, the uncertainty ranking for both the kW and kWh savings is LOW.



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 PY2013 were slightly lower than claimed savings resulting in realization rates over 95 percent for demand (kW) and nearly 100 percent (99.2 percent) for energy (kWh) savings.

The commercial sector kW realization rate was adjusted downward slightly for one project in the Commercial Standard Offer Program (CSOP). All other programs’ evaluated savings were equal to or slightly higher than claimed savings.

The residential sector’s realization rate was affected primarily by the Residential SOP (RSOP), Hard to Reach (HTR) SOP, and Targeted Low Income Energy Efficiency programs. From the tracking system review, these programs resulted in savings over 100 percent which were primarily driven by adjustments to claimed energy and peak savings to be consistent with TRM 1.0. In particular, the duct sealing measures were not updated using the winter peak demand savings calculation. In addition, adjustments were made to savings based on differences in values for air infiltration and duct efficiency improvements. The Targeted Low Income Energy Efficiency program evaluation also identified a slight discrepancy in the refrigerator savings when compared with the TRM Version 1.0 Volume 2.

However, on-site M&V identified sufficient discrepancies amongst these programs that adjusted the final realization rates downwards. These findings affected evaluated savings for air infiltration reduction and duct efficiency improvement measures. On-site M&V for the Targeted Low Income Energy Efficiency program also identified several discrepancies with documentation on insulation installations and HVAC equipment.

Table 2-1 shows the claimed and evaluated demand savings for AEP TNC’s portfolio and broad customer sector/program categories for PY2013.

Table 2-1. AEP TNC Program Year 2013 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kw)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kw)	Precision at 90% Confidence
Total Portfolio		6,932	6,641	95.8%	5.7%
Commercial Sector	18.3%	1,267	1,268	100.0%	24.9%



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

Level of Analysis	Percent Portfolio Savings (kw)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kw)	Precision at 90% Confidence
Residential Sector	21.0%	1,454	1,163	80.0%	18.2%
Load Management	59.3%	4,112	4,112	100.0%	0.0%
Pilots	1.4%	98	98	100.0%	0.0%

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

Table 2-2 shows the claimed and evaluated energy savings for AEP TNC’s portfolio and broad customer sector/program categories for PY2013.

Table 2-2. AEP TNC Program Year 2013 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		9,086,796	9,057,235	99.7%	14.1%
Commercial Sector	57.8%	5,253,955	5,254,730	100.0%	22.2%
Residential Sector	38.0%	3,457,058	3,326,721	99.1%	15.2%
Load Management	0.4%	37,015	37,015	100.0%	0.0%
Pilots	3.7%	338,769	338,769	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 qualitative rating of low, medium, and high associated with the uncertainty of the verification effort based on program documentation received from the utility. The most favorable rating for uncertainty of “low” was given when thorough and detailed documentation was received to verify the savings. The “high” uncertainty rating was given when the EM&V team received primarily project-level savings calculations without supporting documentation to verify the inputs in the calculations.



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

It is important to note that this uncertainty rating is specific to program documentation received to verify claimed savings and is not an indicator of the reasonableness or accuracy of savings estimates.

Based on these uncertainty ranking, the sufficiency of program documentation provided to the EM&V team to complete a third-party due diligence review of evaluated demand savings is indicated as good, fair, or limited. For the utility program documentation score, the ranking of “good” was given if 90 percent or more of the evaluated savings estimates received a ranking of low or medium uncertainty due to program documentation received as indicated in detailed program findings. A ranking of “fair” was given if 70 percent–89 percent of the evaluated savings estimates received a ranking of low or medium. A ranking of “limited” was given if less than 70 percent of savings received an uncertainty ranking of low or medium. In general, a ranking of “good” indicates the utility has established processes to collect sufficient documentation to verify savings; a ranking of “fair” also indicates established processes with some areas of improvements identified; and a ranking of “limited” indicates program documentation improvements across more individual programs and/or high savings programs have been identified. 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 PY2013.

2.1.2 Cost-effectiveness results

AEP TNC’s overall portfolio had a cost-effectiveness of 2.99, or 3.29 excluding low-income programs.

The more cost-effective programs were Commercial SOP and Residential SOP. The less cost-effective programs were Residential SMART Source Solar PV MTP, Targeted Low-Income Energy Efficiency Program, and Irrigation Load Management MTP. The low cost-effectiveness ratio for the Irrigation Load Management MTP reflects the minimal savings reported against the incentives paid out through the program. The Targeted Low-Income Energy Efficiency Program and the Irrigation Load Management MTP both did not pass cost-effectiveness testing.

The lifetime cost of PY2013 evaluated savings was \$0.020 per kWh and \$15.86per kW.

Table 2-3. AEP TNC Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Total Portfolio	3.06	2.99
Total Portfolio excluding low-income programs	3.34	3.29
Commercial Sector	3.68	3.68
Commercial Solutions MTP	3.84	3.84
Commercial SOP	5.57	5.57
Open MTP	2.27	2.27
SCORE/CitySmart MTP	5.03	5.03



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

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
SMART Source Solar PV MTP (Nonresidential)	2.51	2.51
Residential Sector	4.09	3.95
Residential SOP	5.05	5.16
SMART Source Solar PV MTP (Residential)	1.00	1.00
Hard-to-Reach SOP	3.29	2.59
Low-Income	1.48	0.91
Targeted Low-Income Energy Efficiency Program	1.48	0.91
Load Management	0.81	0.81
Irrigation Load Management MTP	0.19	0.19
Load Management SOP	1.68	1.68
Pilots	1.77	1.77
A/C Distributor Pilot MTP	1.77	1.77

2.2 DETAILED FINDINGS—COMMERCIAL

2.2.1 Commercial standard offer

The table below compares the savings claimed by AEP TNC to the evaluated savings estimates for the CSOP program. Evaluated savings for the AEP TNC CSOP had a minor change to the demand savings from the claimed savings taken from the program tracking system. No changes were made to the evaluated energy savings, from the claimed savings taken from the program tracking system. Evaluated realization rates for the AEP TNC CSOP were 100 percent for energy savings and 99.9 percent for demand savings.

A. Commercial Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)*	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)*	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
4.1%	282	282	99.9%	13.8%	1,251,684	1,251,684	100.0%	HIGH

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
20	2	2	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.



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

The CSOP evaluation focused on desk reviews, customer surveys, market actor surveys, and on-site M&V. The sample of reviews and surveys performed for this program are listed below in the table above.

The evaluated realization rates for demand were driven by a single site, with a demand realization rate of 99 percent. The project specific savings adjustments are listed below:

Project ID No. 392738: No changes were made to the reported energy and demand savings from what was shown in the project savings calculator. However, the project savings calculator reported demand savings of 15.86 kW while the tracking data demand savings of 16.02 kW. This was the only reason for the discrepancy in the demand savings. There was no discrepancy in the energy savings and the energy realization rate was 100 percent.

Table 2-4. CSOP Documentation Quality Assessment

Sufficient Documentation	Insufficient Documentation	No Documentation	Completed Desk Reviews
6	14	0	20

As shown in the above table, the documentation provided for the AEP TNC CSOP was sufficient for only 30 percent of the projects that were reviewed. Without adequate documentation, the EM&V Team was not able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (wattages, efficiencies, ballast factors, etc.). Therefore, documentation for the AEP TNC CSOP evaluation has been assigned an uncertainty rating of HIGH, as they have provided sufficient documentation for fewer than 70 percent of the projects in the sample.

2.2.2 Commercial Market Transformation Program

A. Commercial Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
3.4%	237	237	100.0%	10.8%	984,202	984,202	100.0%	MEDIUM

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
12	14	3	7

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

Evaluated savings for the 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.



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

The EM&V team was not able to verify key inputs and assumptions (e.g., equipment quantity) for 2 of the 12 sites that had desk reviews completed because insufficient documentation was provided for the site. In particular, AEP TNC did not provide the EM&V team with the requested material invoices for the HVAC units as these sites were not post inspected. For these sites, we were unable to verify the HVAC unit quantities. Also, 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 post inspection field notes. Since sufficient documentation was provided for 83 percent of the sampled sites, the uncertainty ranking for these estimates is MEDIUM.

B. SCORE/CitySmart Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
5.5%	382	382	100.0%	17.3%	1,569,698	1,569,698	100.0%	MEDIUM

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
8	7	1	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.

Evaluated savings for the SCORE/CitySmart 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 not able to verify key inputs and assumptions (e.g., equipment quantity) for one of the eight sites that had desk reviews completed because insufficient documentation was provided for the site. In particular, AEP TNC did not provide the EM&V team with the requested material invoices, post inspection field notes, or new construction drawings for the lighting fixtures. For this site, we were unable to verify the lighting fixture quantities. Since sufficient documentation was provided for 88 percent of the sampled sites, the uncertainty ranking for these estimates is MEDIUM.

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

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
1.2%	81	81	100.0%	1.7%	156,016	156,016	100.0%	LOW



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

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
2	0	0	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.

Evaluated savings for the PV/Solar Pilot MTP (Nonresidential) were 81 kW demand and 156,016 kWh annual energy, with realization rates of 100 percent.

Evaluated savings matched claimed or reported savings from program administrators exactly; 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 LOW.

2.3 DETAILED FINDINGS—RESIDENTIAL

2.3.1 Residential Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)*	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)*	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
13.9%	962	751	78.1%	26.3%	2,385,467	2,613,041	109.5%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
20	16	7	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.

Evaluated savings for the Residential SOP were 962 kW and 2,613,041 kWh, with realization rates of 78 percent and 110 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.



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

A. Data review

The data review realization rates are 149 percent for kWh and 107 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is not officially effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No 41722¹¹). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation. The impact of this difference is a realization rate of 201 percent for energy and 118 percent for demand. This is the largest driver of the program's data review realization rate.

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the "adjusted" savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, ceiling insulation, and wall insulation.

B. Desk reviews

The EM&V team identified only one discrepancy through this process: for one project, the reported pre-retrofit air leakage for duct efficiency improvements were recorded in the tracking database did not reflect those found in project documentation.

C. Site visits

Site visits were conducted for ten projects.¹² 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, natural 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.

Discrepancies beyond 20 percent were noted for five of the six homes that received a site visit after duct improvements were performed. In cases where discrepancies were noted, the site visit measured leakage was 150 percent to 269 percent higher than reported.

Discrepancies beyond 10 percent were noted for five of the six homes that received a site visit after air sealing was performed. In cases where discrepancies were noted, the site visit measured infiltration was between 25 percent lower and 120 percent higher than reported. For one site, the infiltration measured during the site visit was higher than the reported pre-retrofit leakage.

¹¹ Petition to approve revisions to residential deemed savings to incorporate winter peak demand impacts and update certain existing deemed savings values

¹² Five of these sites had insufficient documentation to complete a desk review, for which a realization rate was imputed from the desk reviews for remaining projects.



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

Discrepancies were also noted for the installation of ceiling insulation at one site, in which the initial R-value reported in the tracking database did not align with that found during the site visit.

D. Documentation

Desk reviews were completed for 20 projects, with documentation requested for a total of 26 sites through the supplemental data request. Of these sites, documentation was provided for 26, and 26 had sufficient documentation for review. Since sufficient documentation was provided for 90 percent of the 26 sampled sites, the uncertainty ranking for these estimates is LOW.

2.3.2 Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)*	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)*	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
5.0%	349	227	79.4%	8.4%	767,152	601,524	78.4%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
6	6	4	6

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

Evaluated savings for the AEP TNC Hard-to-Reach SOP were 277 kW and 601,524 kWh, with realization rates of 79 percent and 78 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

A. Data review

The data review realization rates are 129 percent for kWh and 105 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation. The impact of this difference is a realization rate of 171



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percent for energy and 106 percent for demand. This is the largest driver of the program’s data review realization rate.

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement) based on Project No. 41722.¹³ However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the table below.¹⁴ These assumptions result in a conservative estimate of savings as they are generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (63 percent for kWh and 179 percent for kW), these measure comprise a small percentage (<1 percent) of the total program savings, so the overall impact on the program’s realization rate is minimal.

Table 2-5. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, ceiling insulation, and CFLs.

B. Desk review

The EM&V team identified discrepancies in one measure through this process: CFLs. In one project, the wattage ranges reported for CFL installations did not reflect project documentation.

¹³ Petition to approve revisions to residential deemed savings to incorporate winter peak demand impacts and update certain existing deemed savings values.

¹⁴ These assumed values were provided by Frontier.



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C. Site visits

Site visits were conducted for six projects.¹⁵ 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, natural 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.

Discrepancies beyond 20 percent were noted for all four homes that received a site visit after duct improvements were performed. The site-visit-measured leakages were 222 percent to 1610 percent higher than reported. For one home, the duct leakage measured during the site visit was higher than the reported pre-retrofit leakage.

Discrepancies beyond 10 percent were noted for four of the six homes that received a site visit after air sealing was performed, while the infiltration level in the two remaining homes could not be verified during the site visit. In cases where discrepancies were noted, the site-visit-measured infiltration was between 62 percent lower and 61 percent higher than reported. For one site, the square footage of the home recorded during the site visit did not match that reported in the tracking system.

D. Documentation

Desk reviews were completed for six projects, with documentation requested for a total of 12 sites through the supplemental data request. Of these sites, documentation was provided for 12, and 12 had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

2.3.3 Residential market transformation

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

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.5%	33	33	100.0%	0.7%	62,800	62,800	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
7	0	1	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.

¹⁵ All of these sites had sufficient documentation to complete a desk review.



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Evaluated savings for the PV/Solar Pilot MTP (Residential) were 33 kW demand and 62,800 kWh annual energy, with realization rates of 100 percent.

Evaluated savings matched claimed or reported savings from program administrators exactly; the evaluation activities found no evidence of differences between installed and tracked system capacity. This finding was based on our desk review of seven 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 LOW.

2.3.4 Targeted Low-Income Energy Efficiency Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
1.6%	111	103	92.4%	2.7%	241,639	149,357	61.8%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
7	7	0	6

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

Evaluated savings for the AEP TNC Targeted Low-Income program were 103 kW and 149,357 kWh, with realization rates of 92 percent and 62 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

A. *Data review*

The data review realization rates are 106 percent for kWh and 102 percent for kW. This is due in part to the EM&V team using the deemed savings reflected in TRM Version 1.0 Volume 2. In particular, savings for duct sealing measures were not consistent with the TRM Version 1.0. The impact of these differences are realization rates for duct sealing of 116



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percent for energy and 73 percent for demand (approximately 10 percent and 4 percent of total program energy and demand savings, respectively).

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement). However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the table below.¹⁶ These assumptions result in a conservative estimate of savings as they are generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (63 percent for kWh and 74 percent for kW), these measure comprise a small percentage (<1 percent) of the total program savings, so the overall impact on the program’s realization rate is minimal.

Table 2-6. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, heat pump, window AC, and CFLs.

In addition, the remaining lifetime table used to calculate claimed savings for refrigerators differs from the values used by the EM&V Team and those presented within the TRM Version 1.0 Volume 2. The impact of this difference is a realization rate of 99 percent for energy and 99 percent for demand.

Lastly, no demand savings were claimed for ceiling fans; however, the overall impact of this change is <0.1 kW.

¹⁶ These assumed values were provided by Frontier.



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B. Desk review

No discrepancies were identified by the EM&V team through this review.

C. Site visits

Site visits were conducted for six projects.¹⁷ 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, natural variation is expected. For infiltration measures, variation within 10 percent is expected for blower door test results.

Discrepancies beyond 10 percent were noted for the home that received a site visit after air sealing was performed. In the case where a discrepancy were noted, the site visit measured infiltration was 26 percent higher than reported.

Discrepancies were also noted for ceiling insulation and wall insulations measures. For one site, the initial R-value of ceiling insulation found during the site visit did not align with that recorded in the tracking database. For one site, the heating system type for the wall insulation found during the site visit did not align with that recorded in the tracking database.

D. Documentation

Desk reviews were completed for seven projects, with documentation requested for a total of eight sites through the supplemental data request. Of these sites, documentation was provided for eight, and eight had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

2.4 DETAILED FINDINGS—LOAD MANAGEMENT

2.4.1 Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
51.1%	3,543	3,543	100.0%	0.4%	32,461	32,461	100.0%	LOW

¹⁷ All of these sites had sufficient documentation to complete a desk review.



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Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
13	1	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 PY2013 evaluation activities found that the individual participant load impact calculations in the work papers supplied to the EM&V Team were the same to those validated by using the individual customer interval load data. There were 13 reported program participants in 2013. 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 during the 2013.

Evaluated savings for the AEP TNC Load Management Standard Offer program were 3,543 kW and 32,461 kWh. An inconsistency for the calculation of the kW impact for an unscheduled event was identified, but the calculation of the kWh impact incorporated the May scheduled test event.

The realization rate for kW and kWh was 100 percent.

2.4.2 Irrigation Load Management Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
8.2%	569	569	100.0%	0.1%	4,554	4,554	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
7	0	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 program findings presented here are for the 2013 Irrigation Load Management Program. This program is new to 2013. Three events were initiated in the summer of this year. The EM&V Team verified that there were seven customer accounts participating in the program. Events were called on three days during the summer of 2013.

Evaluated savings for the AEP TNC Irrigation Load Management Program were 569 kW and 4,554 kWh. The realization rate was 100 percent for kW and kWh; the evaluated savings matched the reported savings.



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2.4.3 Open Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
4.1%	285	286	100.2%	14.2%	1,292,355	1,293,130	100.1%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
5	0	0	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.

The realization rate for the Open MTP nearly 100 percent and was slightly increased by savings adjustments from desk review results. For site #181569, the <10 percent non-operating lighting fixtures found during the pre-inspection were not removed from the savings resulting in slightly understated project energy savings. The change in savings resulted in increased savings (site #181569 kWh realization rate =100.1 percent and kW realization rate =100.2 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, specifications, non-operating fixtures) for five of the five sites that had desk reviews completed because sufficient documentation was provided for the site. 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 customer proposals, inspection summary files, and documentation regarding pre-lighting equipment non-operating fixtures. Since sufficient documentation was provided for all of the sampled sites, the uncertainty ranking for these estimates is LOW.

2.5 DETAILED FINDINGS—PILOTS

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

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
1.4%	98	98	100.0%	3.7%	338,769	338,769	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
7	9	4	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.



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Evaluated savings for AEP TNC's A/C Distributor Pilot MTP were the same as the claimed savings; thus, realization rates for both kW and kWh are 100 percent.

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 letter to the customer, 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 Deemed Savings Manual (and moving forward, the TRM). The EM&V also received field inspection notes.

The EM&V team reviewed AEP TNC's stated algorithms and compared the claimed savings against those algorithms and the Deemed Savings Manual. 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 uncertainty ranking for these estimates is LOW.



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 PY2013 were nearly 100 percent for both demand (kW) and energy (kWh) savings at 99.6 percent and 99.1 percent, respectively.

The commercial sector programs' realization rates were at or near 100 percent. While the Commercial Standard Offer Program (CSOP) realization rate was near 100 percent, there were adjustments made at the project-level based on desk reviews and on-site M&V. Only six of the 35 projects that had M&V resulted in adjustments of more than ten percent, which were comprised primarily of lighting and HVAC retrofits.

Adjustments were made to the following residential programs: Residential SOP (RSOP), Hard to Reach (HTR) SOP, and Agencies in Action. For each of these programs, the initial tracking system review resulted in initial evaluated savings over 100 percent. This increase was primarily driven by adjustments to claimed energy and peak savings to be consistent with TRM 1.0. In particular, the duct sealing measures were not updated using the winter peak demand savings calculation. In addition, adjustments were made to savings based on differences in values for air infiltration and duct efficiency improvements.

For each of these programs, but HTR SOP in particular, on-site M&V identified sufficient discrepancies amongst these programs that adjusted the final realization rates downwards. These findings affected evaluated savings for duct efficiency improvement and insulation measures.

Related to the Residential Market Transformation (RMTP) programs, minor adjustments were also made to the Advanced Lighting Residential and Home Performance with ENERGY STAR programs. The Advanced Lighting program savings were reduced very slightly (by 0.3 percent) due to adjustments in baseline assumptions. Additionally, Home Performance with ENERGY STAR program savings increased for kW and decreased for kWh due to zones indicated for the duct efficiency measures.

Table 3-1 shows the claimed and evaluated demand savings for CenterPoint's portfolio and broad customer sector/program categories for PY2013.



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

Table 3-1. CenterPoint Program Year 2013 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Precision at 90% Confidence
Total Portfolio		193,843	193,144	99.6%	1.4%
Commercial Sector	8.5%	16,572	15,978	96.4%	16.6%
Residential Sector	10.9%	21,094	20,988	99.5%	3.3%
Load Management	79.0%	153,041	153,041	100.0%	0.0%
Pilots	1.6%	3,137	3,137	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 3-2 shows the claimed and evaluated energy savings for CenterPoint’s portfolio and broad customer sector/program categories for PY2013.

Table 3-2. CenterPoint Program Year 2013 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		148,039,736	146,766,780	99.1%	8.4%
Commercial Sector	60.6%	89,701,845	88,391,052	98.5%	13.9%
Residential Sector	34.2%	50,687,516	50,725,352	100.1%	1.5%
Load Management	0.3%	459,123	459,123	100.0%	0.0%
Pilots	4.9%	7,191,252	7,191,252	100.0%	0.0%

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

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 qualitative rating of low, medium, and high associated with the uncertainty of the verification effort based on program documentation received from the utility. The most favorable rating for uncertainty of “low” was given when thorough and detailed documentation was received to verify the savings. The “high” uncertainty rating was given when the EM&V team received primarily project-level savings calculations without supporting documentation to verify the inputs in the calculations. It is important to note that this uncertainty rating is specific to program documentation received to verify claimed savings and is not an indicator of the reasonableness or accuracy of savings estimates.

Based on these uncertainty ranking, the sufficiency of program documentation provided to the EM&V team to complete a third-party due diligence review of evaluated demand savings is indicated as good, fair, or limited. For the utility program documentation score, the ranking of “good” was given if 90 percent or more of the evaluated savings estimates received a ranking of low or medium uncertainty due to program documentation received as indicated in detailed program findings. A ranking of “fair” was given if 70 percent–89 percent of the evaluated savings estimates received a ranking of low or medium. A ranking of “limited” was given if less than 70 percent of savings received an uncertainty ranking of low or medium. In general, a ranking of “good” indicates the utility has established processes to collect sufficient documentation to verify savings; a ranking of “fair” also indicates established processes with some areas of improvements identified; and a ranking of “limited” indicates program documentation improvements across more individual programs and/or high savings programs have been identified. The overall program documentation score for CenterPoint was good for kW and good 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 PY2013.

3.1.2 Cost-effectiveness results

CenterPoint’s overall portfolio had a cost-effectiveness of 3.03, or 3.54 excluding low-income programs.

The more cost-effective programs were Commercial SOP and ENERGY STAR® Homes MTP. The less cost-effective programs Energy Wise Resource Action MTP and Load Management SOP.

The Home Performance with ENERGY STAR® program did not pass cost-effectiveness, and CenterPoint has already cancelled this program for 2014. The Sustainable Schools Pilot program did not pass cost-effectiveness, but it is a pilot program and is not required to pass cost-effectiveness for the first two years of operation.

The lifetime cost of PY2013 evaluated savings was \$0.018 per kWh and \$15.50 per kW.

Table 3-3. CenterPoint Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Total Portfolio	3.06	3.03
Total Portfolio excluding low-income programs	3.59	3.54



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

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Commercial Sector	4.99	4.90
Commercial SOP	5.90	5.76
Texas SCORE MTP (Commercial MTP)	3.48	3.48
Retro-commissioning MTP	4.38	4.38
Advanced Lighting MTP (Nonresidential)	2.26	2.26
Residential Sector	3.84	3.80
ENERGY STAR Homes MTP	6.57	6.57
Residential & Small Commercial SOP	2.93	3.17
Advanced Lighting MTP (Residential)	3.09	3.08
A/C Distributor MTP	2.54	2.54
Home Performance with ENERGY STAR MTP	0.18	0.18
Energy Wise Resource Action MTP	1.07	1.07
Multi-family Water & Space Heating MTP (Residential)	3.64	3.64
Hard-to-Reach SOP	2.36	1.94
Multi-family Water & Space Heating MTP (Hard-to-Reach)	2.22	2.22
Low-Income	1.40	1.47
Agencies in Action MTP	1.40	1.47
Load Management	1.36	1.36
Load Management SOP	1.36	1.36
Pilots	1.10	1.10
Sustainable Schools Pilot	0.96	0.96
Retail Electric Provider Pilot MTP (Nonresidential)	1.20	1.20
Retail Electric Provider Pilot MTP (Residential)	1.09	1.09

3.2 DETAILED FINDINGS—COMMERCIAL

3.2.1 Commercial standard offer

A. Large Commercial Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings* (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings* (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
6.3%	12,245	11,645	95.1%	43.9%	65,056,580	63,755,448	98.0%	LOW



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Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
72	48	20	35

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

Evaluated savings for the CenterPoint CSOP were slightly lower than the claimed savings, resulting in realization rates lower than 100 percent for both demand and energy savings. Evaluated realization rates for the CenterPoint CSOP were 98 percent for energy savings and 95 percent for demand savings.

The CSOP evaluation focused on desk reviews, customer surveys, market actor surveys, and on-site M&V. The sample of reviews and surveys performed for this program are listed above.

The evaluated realization rates were driven by adjustments made during the desk review and on-site verification process. A total of 12 projects had realization rates that were not equal to 100 percent and were adjusted. These adjusted realization rates ranged from 0 percent to 125 percent for both energy and demand. From the 12 projects with adjusted realization rates, six projects were found to be major drivers for the lower evaluated realization rates, which had savings adjusted by +/-10 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 #662773: This project involved a lighting retrofit with an installation of LED bulbs. One of the measures, confirmed by the manufacturer spec sheets, was not certified by either Energy Star® or Design Lights Consortium (DLC), which is required by for all LED fixtures. Therefore, the savings were not credited for this measure, and the resulting realization rate for both energy and demand savings was 68 percent.

Project ID #616879: Based on the evaluation review, the project savings claim was found to be incorrect. This customer implemented multiple projects and this savings claim was found to be incorrect since there was no calculator or documentation in support of this claim. Therefore, the realization rate for this project was set as 0 percent for both energy and demand.

Project ID #392721: This project involved the retrofit of an HVAC system in an office building. The calculations were provided in the 2012 CalcSmart calculator and based on the building type, "Large Office." PUCT Docket 40885 and an updated 2013 CalcSmart calculator (v.11.14.12) were released at the end of 2012, and updated both the building types and the energy and demand coefficients. As the application date for this project was in February 2013, the updated 2013 version of the calculator should have been used. These savings have been recalculated based on the 2013 version of the energy and demand coefficients, and the resulting realization rates are 78 percent for energy and 91 percent for demand.

Project ID #392717: This project involved an HVAC retrofit which was originally claimed as an Early Retirement retrofit. During the on-site verification, the EM&V Team discovered that the chiller was almost 45 years old, installed in 1969 and was experiencing



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significant problems. Due to the combination of age (almost double its EUL), and the operating conditions of the chiller, the evaluation team adjusted the baseline of this project to represent a Replace-on-Burnout type project. As a result, the realization rates for this project were calculated to be 64 percent and 54 percent for energy and demand respectively.

Project ID #392739: This project involved HVAC retrofits that were claimed as Early Retirement retrofits. During the on-site verification, the evaluation team found that two of the four chillers were not functioning. Therefore, the baseline condition for these two chillers were adjusted to Replace-on-Burnout from Early Retirement. As a result, the realization rates for this project were calculated to be 84 percent and 74 percent for energy and demand respectively.

Project ID #616800: A lighting retrofit was performed at this facility. The lighting calculator that was provided claimed a quantity of “zero” for one of the lighting records, when the on-site verification performed by the EM&V Team confirmed that 31 fixtures in that area had actually been retrofitted. This increased the savings claim for the site and the realization rates were recalculated to be 125 percent for both energy and demand.

Table 3-4. CSOP Documentation Quality Assessment

Sufficient Documentation	Insufficient Documentation	No Documentation	Completed Desk Reviews
66	2	4	72

As shown above, the documentation provided for the CenterPoint CSOP was sufficient for 92 percent of the projects that were reviewed. Therefore, documentation for the CenterPoint CSOP evaluation has been assigned an uncertainty rating of LOW, as they have provided sufficient documentation for greater than 90 percent of the projects in the sample. For those projects without adequate documentation, the EM&V team was not able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (wattages, efficiencies, ballast factors, etc.).

3.2.2 Commercial market transformation

A. Retro-Commissioning Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)*	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)*	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.4%	695	695	100.0%	4.0%	5,986,874	5,986,874	100.0%	LOW

* Claimed savings varies from savings reported in CenterPoint’s EEPs. The EM&V team only evaluated RCx projects that were fully completed and verified by the Retro-Commissioning program in PY2013.



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

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
4	0	2	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.

Evaluated savings for the Retro-Commissioning MTP were equal to the claimed savings, with realization rates for both kW and kWh equaling 100 percent. The adjustments made to the project savings calculations provided for insignificant differences in claimed versus evaluated savings.

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for all 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 uncertainty ranking for these estimates is LOW.

B. Texas SCORE Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
1.7%	3,270	3,276	100.2%	10.9%	16,101,971	16,092,310	99.9%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
31	12	4	25

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

Evaluated savings for the Score MTP were 3,280 kW and 16,101,971 kWh, with realization rates of 100 percent and nearly 100 percent for demand and energy savings, respectively.

The realization rate for the SCORE MTP was mainly driven by savings adjustments from onsite survey results.

Site #211883: Lighting fixture occupancy sensors were identified during the onsite survey that had not been accounted for in the ex-ante savings calculations. Correcting for the onsite findings results in understated project savings. The change in savings resulted in increased savings (site #211883 kWh realization rate =114 percent and kW realization rate =108 percent).

Site #113752: The projects lighting fixture quantities had corrections made from onsite findings resulting in slightly understated project savings. The corrections included a change in quantity of fixtures retrofitted versus remaining and appears to be a simple clerical error. The change in savings resulted in increased savings (site #113752 kWh and kW realization rate =162 percent).



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

Site #20167: Lighting fixture operating hours utilized were unable to be verified and therefore were adjusted to the deemed value for the building type specified in the project documentation. This correction resulted in overstated project energy savings and no change in demand savings. The change in savings resulted in decreased savings (site #20167 kWh realization rate =72 percent and kW realization rate =100 percent).

The EM&V team was not able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for 1 of the 31 sites that had desk reviews completed because insufficient documentation was provided for the site. In particular, CenterPoint did not provide the EM&V team with the requested material invoices, equipment specification sheets and post inspection field notes for the lighting fixtures. For this site, we were unable to verify the lighting fixture quantities and types for the one Healthcare project rebated under the program. Since sufficient documentation was provided for 97 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

C. Advanced Lighting Commercial Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings* (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings* (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.2%	362	362	100.0%	1.7%	2,556,420	2,556,420	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
6	0	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.

Evaluated savings for the Advanced Lighting Commercial 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 all 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 uncertainty ranking for these estimates is LOW.



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3.3 DETAILED FINDINGS—RESIDENTIAL

3.3.1 Residential and Small Commercial Standard Offer Program

A. Residential and Small Commercial Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.4%	758	740	97.6%	1.0%	1,535,239	1,721,924	112.2%	MEDIUM

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
28	20	5	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.

Evaluated savings for the CenterPoint Residential and Small Commercial SOP were 740 kW and 1,721,924 kWh, with realization rates of 98 percent and 112 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

i. Data review

The data review realization rates are 111 percent for kWh and 98 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722¹⁸). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation. The impact of this difference is a realization rate of 165 percent for energy and 75 percent for demand. This is the largest driver of the program’s data review realization rate.

¹⁸ Petition to approve revisions to residential deemed savings to incorporate winter peak demand impacts and update certain existing deemed savings values.



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

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement) based on Project No. 41722. However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the table below.¹⁹ These assumptions result in a conservative estimate of savings as they are generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (105 percent for kWh and 128 percent for kW), these measure comprise a small percentage (<0.1 percent) of the total program savings, so the overall impact on the program’s realization rate is minimal.

Table 3-5. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, Central AC, CFLs, and ceiling insulation.

ii. Desk review

The EM&V team completed 28 desk reviews and identified discrepancies in four measures through this process: CFL installations, duct efficiency improvements, air infiltration reductions, and windows. In one project, the wattage reported for CFL installations did not reflect project documentation. In two projects, duct efficiency inputs did not match between the provided documentation and the tracking database; in one case, this was due to difference in the recorded pre-retrofit air leakage, in the other, it was due to differences in the recorded pre-retrofit air leakage and cooling tons. In one project, air infiltration inputs did not match between the provided documentation and the tracking database; this was due to differences in the recorded post-retrofit air leakage. For four projects, the window inputs did

¹⁹ These assumed values were provided by Frontier.



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

not match between the provided documentation; in one case, this was due to difference in the recorded heating system type, in the others, this was due to difference in the recorded area of windows installed.

iii. Site visit

Site visits were conducted for 16 projects.²⁰ 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, natural 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.

Discrepancies beyond 20 percent were noted for two of the four homes that received a site visit after duct improvements were performed. In cases where discrepancies were noted, the site visit measured leakage was 30 percent lower to 30 percent higher than reported.

Discrepancies beyond 10 percent were noted for one of the four homes that received a site visit after air sealing was performed. In the case where a discrepancy was noted, the site visit measured infiltration was 195 percent higher than reported; for this site, the infiltration measured during the site visit was higher than the reported pre-retrofit leakage.

Discrepancies were also noted for two window installations, in which the square footage of installed windows or the heating system type did not match that recorded in the tracking database.

iv. Documentation

The EM&V team requested documentation for a total of 71 sites through the supplemental data request. Of these sites, documentation was provided for 54 projects, and 54 had sufficient documentation for review. Since sufficient documentation was provided for more than 70 percent but less than 90 percent of the 71 sampled sites, the uncertainty ranking for these estimates is MEDIUM.

B. Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.8%	1,503	1,180	78.5%	1.9%	2,807,866	2,359,730	84.0%	HIGH

²⁰ Thirteen of these sites had insufficient documentation to complete a desk review, as such the site visit and desk review samples were treated as independent samples rather than as nested samples.



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

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
1	6	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.

Evaluated savings for the CenterPoint’s Hard-to-Reach SOP were 1,180 kW and 2,359,730 kWh, with realization rates of 79 percent and 84 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

i. Data review

The data review realization rates are 106 percent for kWh and 98 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation. The impact of this difference is a realization rate of 148 percent for energy and 72 percent for demand. This is the largest driver of the program’s data review realization rate.

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement) based on Project No. 41722. However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the table below.²¹ These assumptions result in a conservative estimate of savings as they are generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (130 percent for kWh and 277 percent for kW), these measure comprise a small percentage (<1 percent) of the total program savings, so the overall impact on the program’s realization rate is minimal.

Table 3-6. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches

²¹ These assumed values were provided by Frontier.



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

Measure	Parameter	Assumed Value
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, ceiling insulation, window AC, and CFLs.

ii. Desk review

No discrepancies were identified by the EM&V team through this review.

iii. Site visits

Site visits were conducted for three projects.²² 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, natural 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.

Discrepancies beyond 20 percent were noted for the one home that received a site visit after duct improvements were performed. The site visit measured leakages were 68 percent higher than reported, and the heating system type could not be verified.

iv. Discrepancies beyond 10 percent were noted for one home that received a site visit after air sealing was performed. In this instance, the post-treatment measurement of infiltration reduction was 6 percent, which did not meet the 10 percent reduction threshold (relative to the pre-treatment measurement taken just prior to installation).
Documentation

The EM&V team requested documentation for a total of 16 sites through the supplemental data request. Of these sites, documentation was provided for seven, and four had sufficient documentation for review. Since sufficient documentation was provided for less than 70

²² Each of these sites had insufficient documentation to complete a desk review, as such the site visit and desk review samples were treated as independent samples rather than as nested samples.



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

percent of the sampled sites, the uncertainty ranking for these estimates is HIGH.

3.3.2 Residential market transformation

A. A/C Distributor Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
1.0%	1,896	1,896	100.0%	4.1%	6,053,037	6,053,037	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
10	7	6	6

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

Evaluated savings for CenterPoint’s A/C Distributor MTP were the same as the claimed savings; thus, realization rates for both kW and kWh are 100 percent.

First, the EM&V team completed a tracking system review. Only one issue was found during this review. For one case (ACDist_CNP_43681 (air conditioning)) the invoice lists a \$800 rebate for the work performed. The tracking database lists the incentive for work performed as \$758.

Additionally, the EM&V team found that for all other sampled projects neither the CenterPoint Energy documents nor copies of the invoices received stated what the incentive is for the work performed, though the tracking system did. The EM&V recommends that the program ensure incentive information is captured with project-specific documentation.

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 project tracking summary.

The EM&V team reviewed CenterPoint’s project documentation and compared the claimed savings against those in the Deemed Savings Manual. 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). As a result, the uncertainty ranking for both the kW and kWh savings is LOW.



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

B. ENERGY STAR® Homes Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
5.6%	10,804	10,804	100.0%	18.4%	27,260,050	27,260,050	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
30	0	14	0

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

Evaluated savings for CenterPoint’s ENERGY STAR® 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 PY2013, the EM&V team received program input documentation from the implementer, as well as both a REM/Rate²³ and DOE-2²⁴ SIM file for each sampled project. As a result, we were able to create a REM/Rate baseline home file and compared the sampled REM/Rate files to that base home. While the EM&V team is comfortable with the REM/Rate modeling approach, receiving the DOE-2 SIM files for each sampled home 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 30 desk reviews the EM&V team completed, we did see slight variation in realization rates between the REM/Rate files (94 percent) and the DOE-2 SIM files (107 percent). Some of this variation could be related to the fact that the DOE-2 SIM file analysis included a separate lighting calculation, whereas lighting savings are already accounted for in

²³ 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>.

²⁴ 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/>.



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

REM/Rate. The realization rate variation is a direct result of 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. Due to sufficient documentation, the uncertainty ranking for both the kW and kWh savings is LOW.

C. Multi-Family Water & Space Heating Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.3%	582	582	100.0%	0.9%	1,376,736	1,376,736	100.0%	HIGH

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
2	0	0	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.

Evaluated savings for the Multi-Family Water & Space Heating 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 not able to verify key inputs and assumptions (e.g., calculation methodologies and specifications) the two sites that had desk reviews completed because insufficient documentation was provided for the sites. In particular, CenterPoint did not provide the EM&V team with the requested project M&V reports, specifications and project assumptions. For these sites, we were unable to verify the savings methods utilized and critical input assumptions or modelling results. Since sufficient documentation was provided for 0 percent of the sampled sites, the uncertainty ranking for these estimates is HIGH.

D. Advanced Lighting Residential Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)*	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.1%	218	218	99.7%	1.6%	2,394,145	2,386,484	99.7%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
6	0	0	0



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

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

Evaluated savings for the Advanced Lighting Residential MTP were slightly lower than the claimed savings, with realization rates for both kW and kWh equaling 99.7 percent.

The realization rate for the CenterPoint Advanced Lighting Residential MTP was mainly driven by savings adjustments to 17 types²⁵ of lamps within the program. The new product energy use versus the baseline replaced product energy use varied from overstating savings by 15 watts per unit to understating savings by 20 watts per unit. Based on review of the lamp types provided, the EM&V team corrected these unit savings for a census of the program products sold to their respective wattages, which resulted in slightly decreased program savings (kWh and kW realization rate =99.7 percent).

E. Energy Wise Resource Action Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.2%	349	349	100.0%	2.1%	3,161,450	3,161,450	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
10	0	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.

Evaluated savings for CenterPoint’s Energy Wise 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 Energy Wise Program Summary Report for 2013, which included information about savings attributable to each kit component.

²⁵ The 17 new product lamp types the EM&V team adjusted savings for as provided by Ecova include: LED 1.8W A-Line, LED 2.3W Decorative, LED 10.5W R30, LED 11W R30, LED 4” Retro-Fit (11.5W & 13W), LED 6” Retro-Fit (11.5W & 13W), LED 6W MR16, Wall Fixture, LED 20W PAR38, LED 15W PAR30, LED 17W BR40, LED 5.5W PAR16, LED 6” Reflector, and LED 9.5W R30 (9.5W & 10W).



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

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 uncertainty ranking for these estimates is LOW.

F. Home Performance with ENERGY STAR® Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.0%	86	87	102.0%	0.1%	199,901	194,197	97.1%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
18	10	2	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.

Evaluated savings for CenterPoint’s Home Performance with ENERGY STAR® MTP were slightly different than claimed savings, with realization rates for kW and kWh being 102 percent for kW and 97 percent for kWh.

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. These realization rate adjustments were mainly driven by savings modifications to the following measure:

- Duct efficiency. The EM&V team reviewed two projects that resulted in a duct efficiency adjustment. For this project, the duct calculations provided for the project reflected the same energy savings whether it was Zone 2 or Zone 3. The Duct Efficiency Helper reflected different energy values when switching between Zone 2 and Zone 3. When the Duct Efficiency Helper was set to Zone 2 it had the same values as reported for the ex-ante savings. However, the home was actually located in Zone 3, and once correctly coded, the project reflected different energy savings values.

For all sampled projects, the EM&V team reviewed CenterPoint’s stated algorithms and compared the claimed savings against those algorithms and the Deemed Savings Manual. Because the EM&V team received sufficient documentation for all sampled sites, we were able to verify key inputs and assumptions and the uncertainty ranking for these estimates is LOW.



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

3.3.3 Low-income market transformation

A. Agencies in Action Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
2.5%	4,897	5,131	104.8%	4.0%	5,899,093	6,211,744	105.3%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
36	6	0	12

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

Evaluated savings for the CenterPoint's Agencies in Action program were 5,131 kW and 6,211,744 kWh, with realization rates of 105 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

i. Data review

The data review realization rates are 101 percent for kWh and 100 percent for kW. This is due in part to the EM&V team using the deemed savings reflected in TRM Version 1.0 Volume 2. In particular, savings for duct sealing measures were not consistent with the TRM version 1.0. The impact of these differences are realization rates for duct sealing of 200 percent for energy and 99 percent for demand (approximately 1.5 percent and 0.5 percent of total program energy and demand savings, respectively).

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement). However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the table below.²⁶ These assumptions result in a conservative estimate of savings as they are generally reflect the minimum requirements for measure qualification. This adjustment only appear to have a

²⁶ These assumed values were provided by Frontier.



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minor adjustment for this program’s realization rate for water heater measures (100.4 percent for kWh and 100.4 percent for kW).

Table 3-7. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, central AC, and heat pump.

Additionally, there were 11 infiltration reduction projects where the 10 percent minimum reduction was not achieved after accounting for the initial infiltration valued capped at four times the home square footage. No evaluated savings were reported for these projects.

Lastly, the remaining lifetime table used to calculate claimed savings for refrigerators differs from the values used by the EM&V Team and those presented within the TRM version 1.0 volume 2. The impact of this difference is a realization rate of 108 percent for energy and 107 percent for demand.

ii. Desk review

The EM&V team identified discrepancies in four measures through this process: ceiling insulation, CFLs heat pumps, and solar screens.

- For one project, the area insulated did not reflect the project documentation.
- In two projects, the quantity reported for CFL installations did not reflect project documentation.
- In three projects, heat pump inputs did not match between the provided documentation and the tracking database; in one case, this was due to difference in the recorded cooling tons, in another case, this was due to difference in the recorded



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SEER and cooling tons, and in the other, this was due to difference in the recorded SEER, HSPF, and cooling tons.

- For one project, the square footage of installed screens did not match that recorded in the tracking system.

iii. Site visits

Site visits were conducted for 12 projects.²⁷ Discrepancies were noted for CFLs, the installation of heat pumps, and solar screen measures.

- For four projects, the quantity of CFLs found during the site visits did not align with that recorded in the tracking database.
- For three projects, the cooling tons or SEER/HSPF of the heat pumps reported during the site visits did not align with those recorded in the tracking database.
- At two sites, the square footage of installed screens did not match that recorded in the tracking database.

iv. Documentation

The EM&V team requested documentation for a total of 40 sites through the supplemental data request. Of these sites, documentation was provided for 40, and 40 had sufficient documentation for review.²⁸ Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

3.4 DETAILED FINDINGS—LOAD MANAGEMENT

3.4.1 Large Commercial Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
79.0%	153,041	153,041	100.0%	0.3%	459,123	459,123	100.0%	LOW

²⁷ Two of these sites had insufficient documentation to complete a desk review, for which a realization rate was imputed from the desk reviews for remaining projects.

²⁸ One of the sites received was different from that requested.



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Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
552	24	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 PY2013 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 552 reported program participants participating in 2013 and this is the number of participants for which the evaluation team received work papers and interval load data. One event was called during the summer of 2013.

Evaluated savings for the CenterPoint Large Commercial Load Management Standard Offer Program were 153,041 kW and 459,123 kWh. The realization rate for kW and kWh was 100 percent.

3.5 DETAILED FINDINGS—PILOTS

3.5.1 Sustainable Schools Pilot Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings* (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings* (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.1%	161	161	100.0%	0.3%	392,342	392,342	100.0%	HIGH

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
2	0	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.

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. There were no adjustments to any of the savings calculations.

The EM&V team was not able to verify key inputs and assumptions (e.g., calculation methodologies and specifications) for the two sites that had desk reviews completed because insufficient documentation was provided for the sites behavioral measures. In particular, CenterPoint did not provide the EM&V team with the requested project calculators, calculations, methodologies, and project assumptions for the behavioral measures. For these sites, we were unable to verify the behavioral savings for each site and the methods and critical input assumptions utilized. Since sufficient documentation was provided for none of the sampled sites, the uncertainty ranking for these estimates is HIGH.



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

3.5.2 Retail Electric Provider Pilot MTP Program (Nonresidential)

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings* (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings* (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.5%	962	962	100.0%	1.1%	1,607,033	1,607,033	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
1	0	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.

Evaluated savings for CenterPoint’s Retail Electric Provider Pilot 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. What the EM&V team received for each project was the original project data entry sheet and the Tune-up Form. 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 uncertainty ranking for these estimates is LOW.

3.5.3 Retail Electric Provider Pilot MTP Program (Residential)

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings* (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings* (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
1.0%	2,013	2,013	100.0%	3.5%	5,191,877	5,191,877	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
1	0	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.

Evaluated savings for CenterPoint’s Retail Electric Provider Pilot 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. What the EM&V team received for each project was the original



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

project data entry sheet and the Tune-up Form. 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 uncertainty ranking for these estimates is LOW.



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 PY2013 were slightly higher than claimed savings resulting in healthy realization rates over 100 percent for both demand (kW) and energy (kWh) savings.

The realization rates were over 100 percent primarily due to the residential sector evaluated savings and most specifically the evaluated savings for the Hard-to-Reach (HTR) Solutions market transformation program, which had over 200 percent realization rates for kWh and kW. The HTR realization rates were driven by adjustments to claimed energy and peak savings to be consistent with TRM 1.0 for the following measure categories: air infiltration (63 percent kWh, 139 percent kW), ceiling insulation (196 percent kWh, 213 percent kW), window replacement (77 percent kWh, 118 percent kW), and duct insulation (432 percent kWh, 274 percent kW). Another driver of the program's realization rates was wall insulation energy savings where the claimed per-square foot kWh savings were found to be one tenth of the deemed value. This resulted in a sizable impact on the realization rate for energy savings of 2,173 percent kWh.

There were minor adjustments in commercial sector evaluated savings due to onsite M&V findings for the Large C&I and Small Commercial Solution market transformation programs. The onsite M&V resulted in a couple of changes to building types and measure type and quantities.

The realization rates less than 100 percent for the pilot program category were due to the Commercial Rebate Pilot MTP. The EM&V team made corrections to the weather region based on the project location found in desk reviews.

Table 4-1 shows the claimed and evaluated demand savings for El Paso Electric's portfolio and broad customer sector/program categories for PY2013.



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

Table 4-1. El Paso Electric Program Year 2013 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kw)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kw)	Precision at 90% Confidence
Total Portfolio		14,232	14,831	104.2%	2.4%
Commercial Sector	26.1%	3,720	3,717	99.9%	0.0%
Residential Sector	8.2%	1,164	1,800	154.6%	20.1%
Load Management	63.4%	9,028	9,028	100.0%	0.0%
Pilots	2.2%	320	285	89.2%	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 PY2013.

Table 4-2. El Paso Electric Program Year 2013 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		23,958,806	25,192,197	105.1%	1.9%
Commercial Sector	75.9%	18,190,842	18,326,748	100.7%	0.4%
Residential Sector	20.1%	4,807,687	6,085,394	126.6%	7.7%
Load Management	0.0%	11,957	13,547	113.3%	0.0%
Pilots	4.0%	948,320	766,507	80.8%	1.9%

* 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.**



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

In program-level realization rates, we have also included a qualitative rating of low, medium, and high associated with the uncertainty of the verification effort based on program documentation received from the utility. The most favorable rating for uncertainty of “low” was given when thorough and detailed documentation was received to verify the savings. The “high” uncertainty rating was given when the EM&V team received primarily project-level savings calculations without supporting documentation to verify the inputs in the calculations. It is important to note that this uncertainty rating is specific to program documentation received to verify claimed savings and is not an indicator of the reasonableness or accuracy of savings estimates.

Based on these uncertainty rankings, the sufficiency of program documentation provided to the EM&V team to complete a third-party due diligence review of evaluated demand savings is indicated as good, fair, or limited. For the utility program documentation score, the ranking of “good” was given if 90 percent or more of the evaluated savings estimates received a ranking of low or medium uncertainty due to program documentation received as indicated in detailed program findings. A ranking of “fair” was given if 70 percent–89 percent of the evaluated savings estimates received a ranking of low or medium. A ranking of “limited” was given if less than 70 percent of savings received an uncertainty ranking of low or medium. In general, a ranking of “good” indicates the utility has established processes to collect sufficient documentation to verify savings; a ranking of “fair” also indicates established processes with some areas of improvements identified; and a ranking of “limited” indicates program documentation improvements across more individual programs and/or high savings programs have been identified. El Paso Electric received a good kW program documentation score and a fair kWh program documentation score for PY2013. As program documentation recommendations from 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 PY2013.

4.1.2 Cost-effectiveness results

El Paso Electric’s overall portfolio had an evaluated cost-effectiveness of 4.12.

The more cost-effective programs were Commercial SOP and Large C&I Solutions MTP. The less cost-effective programs were Load Management and the Commercial Rebate Pilot Program, both of which had benefit-cost ratios below 1.0. Pilot programs are expected to pass cost-effectiveness after the second year of operation.

The lifetime cost of PY2013 evaluated savings was \$0.015 per kWh and \$11.47 per kW.

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

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Total Portfolio	3.81	4.12
Total Portfolio excluding low-income programs	3.81	4.12
Commercial Sector	6.12	6.16
Commercial SOP	8.96	8.96
Large C&I Solutions MTP	6.90	7.00



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

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Small Commercial Solutions MTP	4.74	4.71
Texas SCORE MTP	4.59	4.59
Appliance Recycling MTP (Nonresidential)	7.11	7.11
Residential Sector	2.02	2.98
Appliance Recycling MTP (Residential)	1.74	1.74
LivingWise MTP	2.58	2.58
Residential Solutions MTP	2.75	2.75
Hard-to-Reach Solutions MTP	1.58	3.81
Load Management	0.97	0.97
Load Management SOP	0.97	0.97
Pilots	1.86	1.63
Commercial Rebate Pilot Program	1.29	0.78
Solar PV Pilot MTP (Nonresidential)	1.83	1.83
Solar PV Pilot MTP (Residential)	2.37	2.37

4.2 DETAILED FINDINGS—COMMERCIAL

4.2.1 Commercial Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2012 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
4.3%	613	613	100.0%	11.4%	2,739,668	2,739,668	100.0%	High

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
6	0	1	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 onsite results and desk review results.

Evaluated savings for the CSOP program were 2,739,668 kWh and 613 kW, which matched the claimed savings. No adjustments in savings were made to any of the projects that were reviewed, so the evaluated realization rate was 100 percent for both the energy and demand savings.



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

Table 4-4. Commercial Standard Offer Program Documentation Quality Assessment

Sufficient Documentation	Insufficient Documentation	No Documentation	Completed Desk Reviews
0	1	5	6

As shown in Table 4-4, the documentation provided for the El Paso Electric CSOP was either insufficient or not provided for all six desk reviews. Without adequate documentation, the EM&V team was not able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (wattages, efficiencies, ballast factors, etc.). Five of these six projects did not include any documentation, other than the savings calculator. Due to the lack of sufficient data for all projects, the El Paso Electric CSOP evaluated savings documentation has been assigned an uncertainty rating of HIGH.

4.2.2 Commercial Market Transformation Programs

A. Large C&I Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
12.4%	1,767	1,762	99.7%	39.1%	9,378,312	9,540,681	101.7%	Low

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
15	11	2	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.

The realization rate for the Large C&I Solutions MTP was driven by savings adjustments from onsite survey and desk review results.

Site #71268–71269: The building type was corrected from onsite and desk review findings resulting in slightly overstated project energy savings. The change in savings resulted in decreased energy and no sizable change in demand savings (site #71268–71269 kWh realization rate equal to 99.8 percent and kW realization rate equal to 100 percent).

Site #71270: The lighting fixtures as identified in the ex-ante calculations did not match the manufacturers data resulting in slightly overstated project savings. The change in savings resulted in a slight decrease in savings (site #71270 kWh and kW realization rate equal to 99 percent).

Site #10529: The building type was corrected resulting in understated energy and overstated demand project savings. The change in savings resulted in increased energy



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

and decreased demand savings (site #10529 kWh realization rate equal to 120 percent and kW realization rate equal to 98 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for 15 of the 15 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 post inspection template for a project done across chain stores. Since sufficient documentation was provided for 100 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

B. Small Commercial Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
5.2%	736	738	100.3%	13.1%	3,136,233	3,111,771	99.2%	Low

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
20	13	5	13

* 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 realization rate for the Small Commercial Solutions MTP was driven by savings adjustments from onsite survey and desk review results.

Site #160984: The building type was corrected from onsite and desk review findings resulting in slightly overstated project energy savings. The change in savings resulted in decreased energy and no sizable change in demand savings (site #160984 kWh realization rate equal to 97 percent and kW realization rate equal to 100 percent).

Site #161570: The building type was corrected from onsite review findings resulting in overstated project energy savings and understated project demand savings. The change in savings resulted in decreased energy and increased demand savings (site #161570 kWh realization rate equal to 93 percent and kW realization rate equal to 103 percent).

Site #213540: The fixture quantity was corrected from onsite findings resulting in understated project savings. The change in savings resulted in increased savings (site #213540 kWh and kW realization rate equal to 102 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for 20 of the 20 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 uncertainty ranking for these estimates is LOW.



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

C. Texas SCORE Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
4.2%	604	604	100.0%	12.2%	2,934,400	2,934,400	100.0%	Low

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
6	9	0	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.

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 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 uncertainty ranking for these estimates is LOW.

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)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
Res	1.3%	190	190	100.0%	5.8%	1,396,097	1,396,097	100.0%	Low
Com	0.0%	0	0	NA	0.0%	2,229	2,229	100.0%	Low



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

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
0	0	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 Data Collection Activities Finalized with Prioritization Memo (dated June 17, 2013) reflects 10 desk reviews allocated to this program (this number was revised to five on October 30, 2013). Due to how this program is delivered and tracked (all electronically and no hard copies), the EM&V team completed program tracking reviews only.

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 PY2013, this program includes three small commercial projects that are included in the residential reporting summary.

The realization rates for this program are driven by 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, it was determined that El Paso Electric should report per unit savings of .101 kW and 743 kWh²⁹ until a petition is approved for revised estimates. For PY2013, El Paso Electric reported these values. They also submitted a petition with different estimates for use in PY2014.

Because the EM&V team had significant correspondence with El Paso Electric and received sufficient documentation for all sampled sites, we were able to verify key inputs and assumptions. As a result, the uncertainty ranking for these estimates is LOW.

B. LivingWise® Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)*	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)*	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.7%	104	104	100.0%	8.8%	2,099,172	2,099,172	100.0%	Low

* Claimed savings differ from the PY2013 EEPR, which reports similar values to the PY2013 project savings.

²⁹ These are based on the most similar Texas approved deemed saving values as the basis to calculate the program realization rate and evaluated savings. This is the retrofit replacement of existing residential units with ENERGY STAR® units, per the “Deemed Savings, Installation & Efficiency Standards” prepared by Frontier Associates, January 2013 update.



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

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
10	0	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.

Evaluated savings for El Paso Electric’s LivingWise 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. 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 2013, 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. Since sufficient documentation was provided for all sampled sites, the uncertainty ranking for these estimates is LOW.

C. Residential Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)*	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
2.1%	299	299	100.0%	2.1%	502,307	502,307	100.0%	Low

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
6	15	3	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.

Evaluated savings for El Paso Electric’s Residential Solutions 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.



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

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 Deemed Savings Manual. 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 uncertainty ranking for these estimates is LOW.

4.3.2 Hard-to-Reach Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
4.0%	571	1,207	211.4%	3.4%	810,111	2,087,819	257.7%	Low

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
81	17	0	9

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

Evaluated savings for the El Paso Electric Hard-to-Reach Solutions MTP were 2,087,819 kWh and 1,207 kW, with realization rates of 258 percent and 211 percent, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three levels: data review (to check tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

A. Data review

The data review realization rates are 258 percent for kWh and 211 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0. For nearly all measures, however, the savings were not updated in the tracking system to reflect the TRM. These discrepancies exist for the following measure categories, resulting in the associated energy and demand realization rates: air infiltration (63 percent kWh, 139 percent kW), ceiling insulation (196 percent kWh, 213 percent kW), wall insulation (92 percent kW – kWh discussed below), window replacement (77 percent kWh, 118 percent kW), and duct insulation (432 percent kWh, 274 percent kW).



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

Another driver of the program’s realization rate relates to an apparent calculation error occurring for wall insulation energy savings. For these measures, the claimed kWh savings per square foot are one tenth of the deemed value. This resulted in a sizable impact on the realization rate for energy savings of 2,173 percent.

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for ceiling insulation.

B. Desk review

Desk reviews were completed for 81 projects. 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 nine projects, all of which received desk reviews where sufficient documentation was provided. All of these sites had sufficient documentation to complete a desk review. No discrepancies were identified by the EM&V team through the site review process.

D. Documentation

Documentation was requested for a total of 141 sites through the supplemental data request. Of these sites, documentation was provided for 140, and 140 had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

4.4 DETAILED FINDINGS—LOAD MANAGEMENT

4.4.1 Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
63.4%	9,028	9,028	100.0%	0.0%	11,957	13,547	113.3%	Low



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

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
10	6	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 PY2013 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 10 reported program participants in 2013 and this is the number of participants for which the evaluation team received work papers and interval load data. One event was called in the summer of 2013.

Evaluated savings for the El Paso Electric Load Management Standard Offer Program were 9,028 kW and 13,547 kWh. The realization rate for kW was 100 percent.

El Paso Electric reported 11,957 in energy savings, but the EM&V team verified that there were 13,547 in energy savings resulting from the program. The realization rate for kWh was 113 percent.

4.5 DETAILED FINDINGS—PILOTS

4.5.1 PV/Solar Pilot Market Transformation Program (Nonresidential)

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)*	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.0%	6	6	100.0%	0.0%	10,848	10,848	100.0%	Low

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
0	0	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.

Evaluated savings for the PV/Solar Pilot MTP (Nonresidential) were 6 kW demand and 10,848 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 desk review of a single installation. 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...

Because no desk reviews were completed for these two non-residential installs, the evaluation leveraged results from the residential desk reviews for similar sites to evaluate savings.

4.5.2 PV/Solar Pilot Market Transformation Program (Residential)

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)*	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
1.7%	240	240	100.0%	1.9%	462,888	462,888	100.0%	Low

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
4	2	0	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.

Evaluated savings for the PV/Solar Pilot MTP (Residential) were 240 kW demand and 462,888 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.

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 LOW.

4.5.3 Commercial Rebate Pilot Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.5%	74	40	53.3%	2.0%	474,584	292,771	61.7%	High



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

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
5	0	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 realization rates for the Commercial Rebate Pilot MTP were driven by savings adjustments from desk review results.

Site #71349: The weather region for the project location was corrected resulting in overstated project savings. The change in savings resulted in decreased savings (site #71349 kWh realization rate equal to 41 percent and kW realization rate equal to 51 percent).

Site #71350–71352: The weather region for the project location was corrected resulting in overstated project savings. The change in savings resulted in decreased savings (site #71350–71352 kWh realization rate equal to 41 percent and kW realization rate equal to 51 percent).

The desk reviews were completed for a sample of projects. The EM&V team was not able to verify all key inputs and assumptions (e.g., equipment quantity and specifications) for two of the five sites because insufficient documentation was provided for those sites. In particular, El Paso Electric was unable to provide the EM&V team with the requested HVAC equipment heating fuel type for the sites that installed HVAC energy management control measures. For these sites, we were unable to verify the heat pump heating type selected for the deemed savings values. Since sufficient documentation was provided for 60 percent of the sampled sites, the uncertainty ranking for these estimates is HIGH.



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

Evaluated demand savings for Entergy were less than claimed savings primarily due to adjustments in the residential sector savings, resulting in an overall portfolio kW realization rate of 91.4 percent. Evaluated energy savings for Entergy were higher than claimed savings again primarily due to residential sector adjustments, resulting in an overall portfolio kWh realization rate of 110.4 percent. The residential sector savings adjustments were primarily resulting from the RSOP and HTR programs' evaluated savings based on a combination of tracking system adjustments for savings to be consistent with TRM 1.0, a few discrepancies found in the desk review process, and on-site M&V results for duct sealing and air infiltration. In addition, changes were made to the Home Performance with ENERGY STAR[®] evaluated savings for discrepancies found in the desk review process.

Overall, commercial sector evaluated savings were very close to claimed savings though several adjustments were made to project-level savings due to on-site M&V and desk review findings regarding fixture type and/or quantity, HVAC size and building type. The Commercial Solutions program realization rates were just under 100 percent and the SCORE/CitySmart program realization rates were just over 100 percent.

Load management evaluated and claimed savings matched exactly.

Table 5-1 shows the claimed and evaluated demand savings for Entergy's portfolio and broad customer sector/program categories for PY2013.



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

Table 5-1. Entergy Program Year 2013 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kw)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kw)	Precision at 90% Confidence
Total Portfolio		19,141	17,489	91.4%	3.2%
Commercial Sector	21.3%	4,086	4,082	99.9%	0.1%
Residential Sector	47.9%	9,164	7,516	82.0%	7.5%
Load Management	30.8%	5,891	5,891	100.0%	0.0%

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

Table 5-2 shows the claimed and evaluated energy savings for Entergy’s portfolio and broad customer sector/program categories for PY2013.

Table 5-2. Entergy Program Year 2013 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		36,995,919	40,816,738	110.3%	4.3%
Commercial Sector	51.8%	19,168,395	19,151,065	99.9%	0.1%
Residential Sector	48.2%	17,821,558	21,659,707	121.5%	8.1%
Load Management	0.0%	5,966	5,966	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 qualitative rating of low, medium, and high associated with the uncertainty of the verification effort based on program documentation received from the utility. The most favorable rating for uncertainty of “low” was



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

given when thorough and detailed documentation was received to verify the savings. The “high” uncertainty rating was given when the EM&V team received primarily project-level savings calculations without supporting documentation to verify the inputs in the calculations. It is important to note that this uncertainty rating is specific to program documentation received to verify claimed savings and is not an indicator of the reasonableness or accuracy of savings estimates.

Based on these uncertainty rankings, the sufficiency of program documentation provided to the EM&V team to complete a third-party due diligence review of evaluated demand savings is indicated as good, fair, or limited. For the utility program documentation score, the ranking of “good” was given if 90 percent or more of the evaluated savings estimates received a ranking of low or medium uncertainty due to program documentation received as indicated in detailed program findings. A ranking of “fair” was given if 70 percent–89 percent of the evaluated savings estimates received a ranking of low or medium. A ranking of “limited” was given if less than 70 percent of savings received an uncertainty ranking of low or medium. In general, a ranking of “good” indicates the utility has established processes to collect sufficient documentation to verify savings; a ranking of “fair” also indicates established processes with some areas of improvements identified; and a ranking of “limited” indicates program documentation improvements across more individual programs and/or high savings programs have been identified. Entergy received documentation scores of limited for both kWh and kW in PY2013.

5.1.2 Cost-effectiveness results

Entergy’s overall portfolio had a cost-effectiveness of 3.63.

The more cost-effective programs were Commercial Solutions MTP and Residential SOP. The least cost-effective program was Load Management. All of Entergy’s programs passed cost-effectiveness.

The lifetime cost of PY2013 evaluated savings was \$0.015 per kWh and \$11.50 per kW.

Table 5-3. Entergy Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Total Portfolio	3.44	3.63
Total Portfolio excluding low-income programs	3.44	3.63
Commercial Sector	4.43	4.42
Commercial Solutions MTP	6.30	6.29
Texas SCORE MTP	2.75	2.75
Residential Sector	3.01	3.31
Residential SOP	3.97	4.56
Hard-to-Reach SOP	2.26	2.36
Entergy Solutions Premium Home MTP	2.05	2.03
Load Management	1.19	1.19



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

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Load Management SOP	1.19	1.19

5.2 DETAILED FINDINGS—COMMERCIAL

5.2.1 Commercial Market Transformation Programs

A. Commercial Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
11.7%	2,245	2,239	99.7%	35.6%	13,156,558	13,136,824	99.9%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
10	10	5	7

* 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 realization rate for the Commercial Solutions MTP was just under 100 percent due to the onsite survey results for one sampled project. For site #160930, lighting fixture types were updated based on onsite findings resulting in overstated project savings. The change in savings resulted in decreased savings (site #160930 kWh realization rate equal to 40 percent and kW realization rate equal to 26 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for 10 of the 10 sites that had desk reviews completed because sufficient documentation was provided for the sites. The sufficient documentation also included modifications made to project savings due to post inspection findings. Since sufficient documentation was provided for 100 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

B. SCORE/CitySmart Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
9.6%	1,842	1,843	100.1%	16.3%	6,011,837	6,014,242	100.0%	LOW



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

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
16	13	3	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.

The realization rate for the SCORE/CitySmart MTP was driven by savings adjustments from onsite survey and desk review results. For site #114781_71520, the size/tonnage of the new chiller was corrected from onsite findings resulting in overstated project savings. The change in savings resulted in decreased savings (site #114781_71520 kWh realization rate equal to 91 percent and kW realization rate equal to 92 percent). For site #114781_10899, the building type was corrected from onsite findings resulting in understated project savings. The change in savings resulted in increased savings (site #114781_10899 kWh and kW realization rates equal to 132 percent). For site #114905, the size/tonnage of the existing chiller that was replaced was determined to be higher than reported resulting in overstated project savings. The change in savings resulted in decreased savings (site #114905 kWh and kW realization rate equal to 95 percent). The on-site M&V adjustment suggest the need for implementation M&V to not only check the model number general tonnage value, but also the manufacturer equipment specifications. For site #114781_71544, the fixture type was corrected from onsite and desk review findings resulting in understated project savings. The change in savings resulted in increased savings (site #114781_71544 kWh and kW realization rates equal to 105 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for 16 of the 16 sites that had desk reviews completed because sufficient documentation was provided for the sites. Information of particular assistance include AHRI reference number, certificate date and certification number and modifications to project savings made due to post inspection findings. Since sufficient documentation was provided for 100 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

5.3 DETAILED FINDINGS—RESIDENTIAL

5.3.1 Residential Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
28.2%	5,397	4,194	77.7%	31.2%	11,547,596	14,850,209	128.6%	HIGH



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

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
73	40	2	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.

Evaluated savings for the Entergy Residential SOP were 4,194 kW and 14,850,209 kWh, with realization rates of 78 percent and 129 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data as observed in the home agrees with the data recorded on the forms). Details on the adjustments at each level are provided below.

A. Data review

The data review realization rates are 140 percent for kWh and 91 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722³⁰). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation methodology. The impact of this difference is a realization rate of 157 percent for energy and 86 percent for demand. This is the largest driver of the program’s data review realization rate.

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement) based on Project No. 41722. However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the Table 5-4 below.³¹ These assumptions result in a conservative estimate of savings as they generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (133 percent for kWh and 204 percent for kW), these measure comprise a small percentage (<0.1 percent) of the total program savings, so the overall impact on the program’s realization rate is minimal.

Table 5-4. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM

³⁰ Petition to approve revisions to residential deemed savings to incorporate winter peak demand impacts and update certain existing deemed savings values.

³¹ Assumed values provided by Frontier.



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

Measure	Parameter	Assumed Value
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

There were also seven instances of infiltration control for which the EM&V team calculated zero savings because the 10 percent minimum reduction was not met after the initial infiltration value was set at the cap of four times the home square footage. This had a minimal impact on the realization rate.

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, ceiling insulation, and CFLs.

B. Desk review

Desk reviews were completed for 73 projects. The EM&V team identified discrepancies in four measures through this process: air infiltration reductions, duct efficiency improvements, CFL installations, and the installation of central air conditioners. In two projects, air infiltration inputs did not match between the provided documentation and the tracking database; in one case, this was due to difference in the heating system type, in the other, it was due to differences in the recorded pre-retrofit air leakage. In three projects, the heating system type used to calculate savings for duct efficiency improvements differed between the program tracking data and project documentation. For 11 projects, the quantity or wattage ranges reported for CFL installations did not reflect project documentation. In two projects, differences in tonnage and SEER for central air conditioner installations were identified either through comparison with the AHRI database, or with the product cut sheet.

C. Site visits

Site visits were conducted for 16 projects.³² 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

³² Six of these sites had insufficient documentation to complete a desk review, for which a realization rate was imputed from the desk reviews for remaining projects.



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

Blaster tests, natural 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.

Discrepancies beyond ±20 percent were noted for five of the ten homes that received a site visit after duct improvements were performed, while eight of the remaining homes could not have duct leakage verified in the home during the site visit, largely due to inaccessibility. In cases where discrepancies were noted, the site-visit-measured leakage was 51 percent to 215 percent higher than reported.

Discrepancies beyond ±10 percent were noted for six of the nine homes that received a site visit after air sealing was performed, while the infiltration level in two of the remaining homes could not be verified during the site visit. In cases where discrepancies were noted, the site-visit-measured infiltration was between 42 percent lower and 113 percent higher than reported. For two sites, the infiltration measured during the site visit was higher than the reported pre-retrofit infiltration. For one site, the square footage measured during the site visit did not align what that recorded in the tracking database.

D. Documentation

Documentation was requested for a total of 132 sites through the supplemental data request. Of these sites, documentation was provided for 160, and 95 had sufficient documentation for review. Since sufficient documentation was provided for less than 70 percent of the sampled sites, the uncertainty ranking for these estimates is HIGH.

5.3.2 Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
9.4%	1,802	1,359	75.4%	10.6%	3,917,393	4,490,116	114.6%	HIGH

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
9	9	2	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.

Evaluated savings for the Hard-to-Reach SOP were 1,359 kW and 4,490,116 kWh, with realization rates of 75 percent and 115 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data as observed in



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

the home agrees with the data recorded on the forms). Details on the adjustments at each level are provided below.

A. Data review

The data review realization rates are 132 percent for kWh and 92 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation. The impact of this difference is a realization rate of 150 percent for energy and 84 percent for demand. This is the largest driver of the program’s data review realization rate.

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement) based on Project No. 41722. However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in Table 5-5 below.³³ These assumptions result in a conservative estimate of savings as they are generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (79 percent for kWh and 209 percent for kW), these measure comprise a small percentage (<0.1 percent) of the total program savings, so the overall impact on the program’s realization rate is minimal.

Table 5-5. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the

³³ Assumed values provided by Frontier.



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

“adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, ceiling insulation, window AC, and CFLs.

Additionally, there were four infiltration reduction projects where the 10 percent minimum reduction was not achieved after accounting for the initial infiltration valued capped at four times the home square footage. No evaluated savings were reported for these projects.

B. Desk review

Desk reviews were completed for nine projects. No discrepancies were identified by the EM&V team through this review.

C. Site visits

Site visits were conducted for four projects.³⁴ 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, natural 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.

No discrepancies beyond ± 20 percent were noted for the three homes that received a site visit after duct improvements were performed, although one of these homes could not have duct leakage verified during the site visit.

Discrepancies beyond ± 10 percent were noted for three of the four homes that received a site visit after air sealing was performed. In cases where discrepancies were noted, the site-visit-measured infiltration was between 30 percent and 113 percent higher than reported.

Discrepancies were also noted for the installation of CFLs at one site, where the tracking system reported that six lamps were installed, but a site visit found only three.

D. Documentation

Documentation was requested for a total of 19 sites through the supplemental data request. Of these sites, documentation was provided for 19, and 9 had sufficient documentation for review. Since sufficient documentation was provided for less than 70 percent of the sampled sites, the uncertainty ranking for these estimates is HIGH.

³⁴ Three of these sites had insufficient documentation to complete a desk review, as such the site visit and desk review samples were treated as independent samples rather than as nested samples.



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

5.3.3 Entergy Solutions Premium Home Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
9.7%	1,855	1,855	100.0%	5.7%	2,105,311	2,105,311	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
5	0	7	0

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

Evaluated savings for Entergy’s ENERGY STAR® Homes MTP were the same as the claimed savings; thus, the realization rate for both kW and kWh is 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/Rate³⁵ 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, the EM&V team received the Entergy Solutions High Performance Homes M&V Manual. This information was 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 PY2014, we suggest continuing discussions focused on demand savings calculations for new homes. Additionally, through the EM&V team’s analysis of the 8760 Excel files received, it appears there may be an opportunity to claim additional savings for lighting and appliances (in one particular home, the home as modeled in

³⁵ 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>.



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

REM/Rate had higher savings in the Lights & Appliances category, which was not claimed in the 8760 model).

Because sufficient supporting documentation for all sampled homes was received, the uncertainty ranking for both the kW and kWh savings is LOW. However, the EM&V team encourages additional discussion in PY2014 related to demand savings and recommends further research into the simulation methods to determine whether additional savings may be warranted for lighting and appliance savings the program may be influencing.

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

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.6%	111	109	98.1%	0.7%	251,258	214,072	85.2%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
12	9	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.

Evaluated savings for Entergy’s Home Performance with ENERGY STAR® MTP were slightly different than claimed savings, with realization rates for kW and kWh being 98 percent for kW and 85 percent for 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 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. These realization rate adjustments were mainly driven by savings modifications to the following measures:

- **CLFs.** For four projects, it was determined that the calculator used included incorrect values for energy and demand savings for CFLs.
- **Central air conditioning.** The EM&V team identified one project where the calculator used savings numbers for a 3.5-ton unit when the actual unit was 1.5 tons.



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

- **Duct efficiency.** The EM&V team reviewed three projects that resulted in a duct efficiency adjustment. For this project, the duct calculations provided for the project reflected the same energy savings whether it was Zone 2 or Zone 3. The Duct Efficiency Helper reflected different energy values when switching between Zone 2 and Zone 3. When the Duct Efficiency Helper was set to Zone 2 it had the same values as reported for the ex-ante savings. However, the home was actually located in Zone 3, and once correctly coded, the project reflected different energy savings values.

For all sampled projects, the EM&V team reviewed Entergy’s stated algorithms and compared the claimed savings against those algorithms and the Deemed Savings Manual. Because the EM&V team received sufficient documentation for all sampled sites, we were able to verify key inputs and assumptions and the uncertainty ranking for these estimates is LOW.

5.4 DETAILED FINDINGS—LOAD MANAGEMENT

5.4.1 Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
30.8%	5,891	5,891	100.0%	0.0%	5,966	5,966	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
46	4	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 PY2013 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 46 reported program participants in 2013 and this is the number of participants for which the evaluation team received work papers and interval load data. There were six days in which events were called in the summer of 2013 but not all participants participated in each event.

Evaluated savings for the Entergy Load Management Standard Offer Program were 5,891 kW and 5,966 kWh. The realization rate for kW was 100 percent and the realization rate for kWh was also 100 percent.



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 PY2013 were considerably higher than claimed savings for all sectors, resulting in realization rates over 138 percent for demand (kW) and 112 percent for energy (kWh) savings.

Realization rates were over 100 percent for both the Basic and Custom Commercial Standard Offer Programs (CSOP). The realization rates for these programs were driven by adjustments made during the on-site verification process. About a quarter of sites with on-site visits resulted in some level of adjustment ranging from 63 percent to 127 percent of claimed savings. As a result, the EM&V team provides several recommendations related to more accurately capturing lighting hours of use to incorporate into the savings calculator.

There were also large adjustments to the Home Energy Efficiency and Hard-to-Reach (HTR) SOPs, particularly for the demand savings which resulted in a realization rate of 175 percent and 188 percent, respectively. The Targeted Low-income Program also resulted in realization rates over 130 percent for both energy and demand savings.

This increase was primarily driven by adjustments to claimed energy and peak savings to be consistent with TRM 1.0 Volume 2. The tracking system savings were not updated to reflect the TRM and contributed to adjustments for infiltration reduction, ceiling insulation, CFL, duct sealing, and water heating measures. The desk review also identified discrepancies between the tracking system and the documentation for these measures.

The savings for the HEE and HTR SOP programs were also adjusted from on-site M&V activities. Air infiltration reduction and duct efficiency improvement measures were most commonly adjusted based on these on-site visits.

All other programs resulted in realization rates at or close to 100 percent.



6. Impact Evaluation Results—Oncor...

Table 6-1 shows the claimed and evaluated demand savings for Oncor’s portfolio and broad customer sector/program categories for PY2013.

Table 6-1. Oncor Program Year 2013 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kw)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kw)	Precision at 90% Confidence
Total Portfolio		112,734	155,940	138.3%	3.8%
Commercial Sector	19.1%	21,545	22,256	103.3%	15.6%
Residential Sector	32.1%	36,190	60,809	168.0%	7.9%
Load Management	48.8%	55,000	72,875	132.5%	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 6-2 shows the claimed and evaluated energy savings for Oncor’s portfolio and broad customer sector/program categories for PY2013.

Table 6-2. Oncor Program Year 2013 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		224,666,448	251,316,469	111.9%	4.8%
Commercial Sector	38.8%	87,282,732	91,359,609	104.7%	8.4%
Residential Sector	61.0%	137,158,207	159,731,351	116.5%	5.8%
Load Management	0.1%	225,509	225,509	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.**



6. Impact Evaluation Results—Oncor...

In program-level realization rates, we have also included a qualitative rating of low, medium, and high associated with the uncertainty of the verification effort based on program documentation received from the utility. The most favorable rating for uncertainty of “low” was given when thorough and detailed documentation was received to verify the savings. The “high” uncertainty rating was given when the EM&V team received primarily project-level savings calculations without supporting documentation to verify the inputs in the calculations. It is important to note that this uncertainty rating is specific to program documentation received to verify claimed savings and is not an indicator of the reasonableness or accuracy of savings estimates.

Based on these uncertainty ranking, the sufficiency of program documentation provided to the EM&V team to complete a third-party due diligence review of evaluated demand savings is indicated as good, fair, or limited. For the utility program documentation score, the ranking of “good” was given if 90 percent or more of the evaluated savings estimates received a ranking of low or medium uncertainty due to program documentation received as indicated in detailed program findings. A ranking of “fair” was given if 70 percent–89 percent of the evaluated savings estimates received a ranking of low or medium. A ranking of “limited” was given if less than 70 percent of savings received an uncertainty ranking of low or medium. In general, a ranking of “good” indicates the utility has established processes to collect sufficient documentation to verify savings; a ranking of “fair” also indicates established processes with some areas of improvements identified; and a ranking of “limited” indicates program documentation improvements across more individual programs and/or high savings programs have been identified. The overall program documentation score for Oncor was good for kW and good 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 PY2013.

6.1.2 Cost-effectiveness results

Oncor’s overall portfolio had a cost-effectiveness of 3.63, or 4.02 excluding low-income programs.

The more cost-effective programs were Commercial SOP (Custom and Basic), Home Energy Efficiency SOP, and Hard-to-Reach SOP. The less cost-effective programs were Residential Solar PV SOP and Targeted Weatherization Low Income SOP. All of Oncor’s programs passed cost-effectiveness analysis.

The lifetime cost of PY2013 evaluated savings was \$0.015 per kWh and \$11.57 per kW.

Table 6-3. Oncor Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Total Portfolio	3.09	3.63
Total Portfolio excluding low-income programs	3.42	4.02
Commercial Sector	3.26	3.41
Commercial SOP (Custom)	4.04	4.06
Commercial SOP (Basic)	5.40	5.82



6. Impact Evaluation Results—Oncor...

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Educational Facilities MTP	2.14	2.13
Small Business Direct Install	1.97	1.97
Government Facilities MTP	2.16	2.19
Air Conditioning MTP (Nonresidential)	1.82	1.82
Solar PV SOP (Nonresidential)	1.53	1.58
Residential Sector	3.73	4.65
Home Energy Efficiency SOP	4.96	6.16
Solar PV SOP (Residential)	1.30	1.31
Air Conditioning MTP (Residential)	2.48	2.48
Hard-to-Reach SOP	2.89	3.91
Low-Income	0.82	1.10
Targeted Weatherization Low Income SOP	0.82	1.10
Load Management	1.17	1.55
Commercial Load Management SOP	1.17	1.55

6.2 DETAILED FINDINGS—COMMERCIAL

6.2.1 Commercial standard offer

A. Commercial Standard Offer Program (Basic)

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
9.2%	10,343	11,015	106.5%	21.2%	47,552,920	51,309,601	107.9%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
46	44	25	42

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

Evaluated savings for the Oncor Basic CSOP were higher than the claimed savings, resulting in realization rates higher than 100 percent for both demand and energy savings. Evaluated realization rates for the Oncor Custom CSOP were 108 percent for energy savings and 107 percent for demand savings.



6. Impact Evaluation Results—Oncor...

The evaluated realization rates were driven by adjustments made during the on-site verification process.³⁶ A total of ten projects had realization rates that were not equal to 100 percent and were adjusted. These adjusted realization rates ranged from 63 percent to 127 percent for both energy and demand. From the ten projects with adjusted realization rates, seven projects were found to be major drivers for the lower evaluated realization rates, which had savings adjusted by +/-10 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 #422140: This project involved a lighting retrofit. During the on-site verification performed, the EM&V Team verified that the post-retrofit fixture count was actually lower than reported. This resulted in an increase in evaluated savings. The on-site realization rate for this project was 111 percent for both energy and demand.

Project ID #426413: The savings calculator for this facility showed 32W T8 lamps as the post-retrofit lamp type. During the on-site verification, the EM&V Team found that many of the post-retrofit lamp types were actually 28W T8s instead. This increased the savings for this facility. The evaluated energy and demand realization rate was calculated at 126 percent.

Project ID #428433: During the on-site verification, the EM&V Team found that the lighting retrofit was performed in conditioned spaces. This differed from the savings calculator, which showed unconditioned space types. The interactive cooling savings that resulted from this change, increased the overall savings for this site. The energy realization rate was calculated to be 105 percent while the demand realization rate was 110 percent.

Project ID #429349: The on-site verification identified an additional six outdoor fixtures which were not originally reported in the savings calculator. These were confirmed by the contractor and the customer to have been installed as part of the same retrofit. The pre-retrofit wattages were reported by customer and confirmed by contractor. These fixtures were photo-cell controlled. As a result, the savings for this site were recalculated, and resulted in a realization rate of 117 percent for both energy and demand.

Project ID #429733: An additional area of the warehouse was found during the on-site verification to have had the lighting replaced at the same time. This was not included in the reported savings. Based on the findings, the savings were recalculated, which resulted in an increase in savings at the site. The energy realization rate was calculated to be 127 percent and the demand realization rate was 126 percent.

Project ID #422222: A lighting retrofit was performed at this facility. The on-site verification performed by the EM&V team identified several issues where the details provided in the calculator were different than what was found onsite. In some cases, the induction fixtures found were either 85W or 100W instead of the 80W fixtures claimed in the calculator. Additionally, some of the fixture counts did not match the calculator-reported quantities, and the conditioned type of one of the activity areas was revised from un-

³⁶ No adjustments were made to any of the Oncor Basic CSOP sites during the desk review process.



6. Impact Evaluation Results—Oncor...

conditioned to conditioned. These changes resulted in an energy realization rate of 90 percent, and a demand realization rate of 91 percent.

Project ID #613817: The lighting retrofit at this facility did not report the presence of occupancy sensors in the savings calculator. These occupancy sensors were found to have been installed on both the pre- and post-retrofit lighting during the on-site verification. Therefore, the savings were recalculated. This resulted in a reduced energy and demand realization rate of 63 percent.

Table 6-4. CSOP Documentation Quality Assessment

Sufficient Documentation	Insufficient Documentation	No Documentation	Completed Desk Reviews
46	0	0	46

As shown in the table, the documentation provided for the Oncor Basic CSOP was sufficient for all of the projects that were reviewed. The documentation for the Oncor Basic CSOP evaluation has been assigned an uncertainty rating of LOW.

B. Commercial Standard Offer Program (Custom)

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
2.0%	2,240	2,261	100.9%	6.5%	14,661,850	14,705,836	100.3%	MEDIUM

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
24	9	4	7

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

Evaluated savings for the Oncor Custom CSOP for demand were slightly higher than 100 percent for both demand and energy savings. Evaluated realization rates for the Oncor Custom CSOP were 100.9 percent for demand savings and 100.3 percent for energy savings. A total of three projects had realization rates that were not equal to 100 percent and were adjusted. These adjusted realization rates ranged from 99 percent to 106 percent for energy and from 99 percent to 115 percent for demand. From the three projects with adjusted realization rates, only one project was found to be a major driver for the lower evaluated realization rates, which 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 #661913: This site involved two chiller retrofits. Their hours of use (HOU) and coincidence factors (CF) were determined through trend data. During the on-site



6. Impact Evaluation Results—Oncor...

verification and review of the chiller trend data, the EM&V Team adjusted the pre- and post-HOU and CF for chiller #2, which resulted in a reduction of savings. The energy realization rate was calculated to be 56 percent and the demand realization rate was 94 percent.

Project ID #655335: This site involved a lighting retrofit. The desk review process identified that the M&V plan reported that the pre-retrofit hours of operation (HOU) and coincidence factors (CF) would be recorded using the post-retrofit logger data recorded from the areas without occupancy sensors. The savings calculator did not accurately represent this. As such, the lighting savings calculator was modified and the savings recalculated to reflect the correct pre-retrofit lighting hours, based on the M&V plan. The energy realization rate was calculated to be 106 percent while the demand realization rate was 115 percent. No on-site survey was performed at this facility.

Table 6-5. CSOP Documentation Quality Assessment

Sufficient Documentation	Insufficient Documentation	No Documentation	Completed Desk Reviews
19	5	0	24

As shown in the above table, the documentation provided for the Oncor Custom CSOP was sufficient for 79 percent of the projects that were reviewed. Without adequate documentation, the EM&V Team was not able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (wattages, efficiencies, ballast factors, etc.). Since sufficient documentation was provided for greater than 70 percent but fewer than 90 percent of the sampled sites the uncertainty ranking for these estimates is MEDIUM.

Findings and Recommendations

Below we highlight several recommendations based on the research completed for the CSOP (Custom) program.

- The M&V method to calculate lighting hours of use (HOU) and coincidence factors (CF) seemed to attempt to capture lighting that was grouped into similar activity areas. Very often, however, the HOU recorded by those loggers varied greatly from logger to logger within the same activity area. A simple average of logger hours instead of weighted average was used across the activity area, which does not account for the variation in HOU from logger to logger. The issue with simple average is that a logger representing a smaller number of lamps with a significantly different usage pattern will provide the same weight to the total HOU for the activity area. There are two ways that this method may be improved:
 - Breaking out the activity areas into better-defined areas that are more representative of the differences in HOU. This will result in the use of more activity areas within the savings calculator and ensure better estimation of operating hours.
 - Providing a weighted average that is weighted by the number of fixtures that can be represented by the logger. These can either be on the same circuit as the logger, or, possibly reported by the customer to turn on and off at the same time



6. Impact Evaluation Results—Oncor...

as the logged circuit. To do this, the fixture count that is represented by that logger will need to be recorded.

C. Commercial Solar PV Installation Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
2.5%	2,836	2,847	100.4%	2.4%	5,391,829	5,645,245	104.7%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
15	9	4	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.

Evaluated savings for the Commercial Solar PV Installation SOP were 2,846 kW demand and 5,644,763 kWh energy, with realization rates of 100.4 percent for demand and 104.7 percent for energy.

The realization rates were driven by adjustments to claimed energy and peak savings made at three projects based on desk reviews. Five additional projects had minor adjustments of less than 5 percent based on desk reviews. The four sites that received on-site M&V had realization rates of 1 for both desk reviews and on-sites. Details on the three larger adjustments are provided below.

Project ID #2013SPV - 2013 - 21055_169687: The project planned to install 26 240W solar PV panels for a planned capacity of 6.24 kW. The project actually installed 60 240W solar PV panels for an actual capacity of 11.95 kW. This raised the project realization rate for both demand savings and annual energy savings (231 percent and 200 percent, respectively).

Project ID #2013SPV - 2013 - 21436_181220: The project planned to install 58 240W solar PV panels for a planned capacity of 13.92 kW. The project changed to 75 240W solar PV panels for an actual capacity of 18 kW. Because this is a deemed project, savings are based on installed capacity. The additional capacity raised the project realization rate for both demand savings and annual energy savings (117 percent and 127 percent, respectively).

Project ID #2013SPV - 2013 - 21140_200405: The Pwatts simulations for this site were originally run for two arrays (27.3 kW and 18.4 kW) for 45.7 kW total. The installed system consists of two arrays but of slightly different capacities (28.08 kW and 12.48 kW) for a total of 40.56 kW. The original estimates for annual energy were adjusted but peak demand savings do not appear to have been adjusted for the smaller capacity. Additionally, the two arrays point southeast and southwest so the aggregated demand savings are lower than the AC capacity due to lack of coincidence of peak array



6. Impact Evaluation Results—Oncor...

generation. These modifications result in a demand (kW) realization rate of 81 percent and an energy (kWh) realization rate of 103 percent.

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 either inspection reports or on-site inspections, so the overall uncertainty ranking for inputs to this savings estimate is considered LOW.

Findings and Recommendations

Below we highlight several recommendations based on the research completed for the Commercial Solar PV Installation SOP.

- The M&V method to calculate peak demand ex-post savings for projects that use PvWatts for estimating ex-ante savings is slightly different from the method the utility used to estimate ex-ante savings. The use of PvWatts to calculate savings is presented in Project No. 40885 (TRM petition) but the demand savings protocol is somewhat ambiguous. The M&V method used maximum simulated hourly output to evaluate peak demand savings. The utility used the rated AC capacity of the project to estimate demand savings. For many projects, this yielded very similar results. For some projects, especially those with multiple arrays, the results varied somewhat between the two methods. One way to improve estimation of demand savings using the PvWatts method would be to add the following clarifications to the TRM or within utility documentation:
 - Add a bullet d1: “Annual savings should be calculated as the sum of simulated annual energy for all arrays present at the project.”
 - Add a bullet f after bullet e: “After exporting hourly savings to Excel, coalesce the output for each array into a single sheet. For the first array, paste the entire output into a worksheet. For any additional arrays, only paste a column of the hourly output for each array into a column in that one worksheet. For example, for a system with three arrays, there should be three columns of "AC Power (W)". Add a column that sums each of the array output columns to determine what the project level hourly performance generation is. Determine the maximum of this column of aggregated hourly energy values. This maximum is the calculated demand savings for the project.”
 - Develop a template for peak demand savings for projects that use the PvWatts to ensure uniform application of this method.
- The National Renewable Energy Lab (NREL) will be releasing a new version of PvWatts (V5) in mid-2014. This version will better reflect actual system performance and improvements in system efficiency over the past decade and will largely raise energy and demand estimates by 10 to 14 percent. This new version will also offer thin film as a discrete module technology choice and therefore may present a method to estimate savings for solar shingles. If possible, the updated version of PvWatts (V5) should be specified for all PY2015 projects using PvWatts to calculate savings.



6. Impact Evaluation Results—Oncor...

6.2.2 Commercial market transformation

A. Air Conditioning Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.3%	328	328	100.0%	0.4%	903,990	903,990	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
35	2	2	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.

Evaluated savings for Oncor’s Air Conditioning 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 project-specific documentation including a Measure Attribute Report, the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Certificate, and a Customer Site Inspection (if applicable). The EM&V team used calculators from PY2012, as calculations remained the same across both program years.

For all sampled measures, the documentation included the energy efficiency ratio (EER). Tonnage was missing for some of the sampled measures (largely for package AC units), but enough information was still available for critical inputs to calculating savings. As a result, the uncertainty ranking for both the kW and kWh savings is LOW.

While Oncor is removing this program from its mix of energy efficiency programs in PY2014, should Oncor decide to offer a similar program in the future, the program should be sure to document tonnage for each project.



6. Impact Evaluation Results—Oncor...

B. Educational Facilities Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
4.3%	4,837	4,816	99.6%	6.1%	13,796,079	13,774,006	99.8%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
44	42	2	22

*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 realization rate for the Educational Facilities MTP was driven by savings adjustments from desk review and site visits.

Site #132228: The claimed savings in the tracking data for this project did not match the savings listed in the calculator provided resulting in slightly overstated project savings. The change in savings resulted in slightly decreased energy and demand savings (kWh realization rate = 99.7 percent and kW realization rate =99.9 percent).

Site #224633: The building type was corrected resulting in understated project savings. The change in savings resulted in increased savings (kWh realization rate =131 percent and kW realization rate =104 percent).

Site #169777: Lighting fixture type and quantities were corrected from onsite findings resulting in overall slightly understated project savings. The change in savings resulted in slightly increased savings (kWh realization rate =100.1 percent and kW realization rate =100.3 percent).

Site #191957: Updates were made to the HVAC project savings based on equipment findings found onsite including equipment type updates from packaged to split DX systems that impacted baseline efficiency resulting in overstated project savings. The change in savings resulted in decreased energy and demand savings (kWh realization rate =98 percent and kW realization rate =96 percent).

Site #198123: Updates were made to both the Lighting and HVAC project savings based on equipment findings found onsite. These findings include HVAC equipment type updates from packaged RTUs to split DX systems and lighting type updates resulting in overstated project savings. The change in savings resulted in slightly decreased energy and demand savings (kWh realization rate =99.9 percent and kW realization rate =98 percent).

Site #170742: Updates were made to lighting fixture quantities based on equipment findings during the onsite survey. The increase in fixture quantities after project implementation was due to a room utilization change at the site. These changes result in overstated project savings and decreased energy and demand savings (kWh and kW realization rate =4 percent).



6. Impact Evaluation Results—Oncor...

Site #179044: Updates were made to lighting fixture types based on equipment findings during the onsite survey. The post retrofit fixture was found to have only one ballast versus two identified in the ex-ante calculator reducing post fixture wattages. These updates result in understated project savings and increased energy and demand savings (kWh and kW realization rate =102 percent).

Site #178230: Updates were made to lighting fixture types and quantities based on equipment findings during the onsite survey. These changes result in overstated project savings and decreased energy and demand savings (kWh and kW realization rate =85 percent).

Site #132289: Updates were made to lighting fixture quantities based on onsite findings resulting in overstated project savings and decreased energy and demand savings (kWh and kW realization rate =89 percent).

Site #195893: Updates were made to HVAC equipment efficiency based on onsite findings resulting in understated project savings and increased energy and demand savings (kWh and kW realization rate =102 percent).

Site #196188: The building type was corrected from onsite findings resulting in understated project savings. The change in savings resulted in increased savings (kWh realization rate =107 percent and kW realization rate =110 percent).

Site #175660: The exterior lighting hours of use (4,145) and coincidence factors (0.64) used in the Oncor calculator were not consistent with the TRM stipulated values for outdoor lighting hours of use (3,996) and coincidence factors (0.61). The EM&V team adjusted the lighting hours of use (HOU) and coincidence factors (CF) to match the TRM values which resulted in a slight reduction of energy and demand savings for this exterior lighting projects. The change in savings resulted in decreased savings (kWh realization rate =96 percent and kW realization rate =95 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and/or specifications) for all 44 sites that had desk reviews completed because sufficient documentation was provided for the sites. In particular, Oncor provided the EM&V team with the requested onsite inspection documentation. For these sites, we were able to use this documentation as verification of lighting fixture types and quantities as identified in the calculators. Since sufficient documentation was provided for 100 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.



6. Impact Evaluation Results—Oncor...

C. Government Facilities Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.8%	890	918	103.2%	2.1%	4,650,116	4,694,757	101.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
30	11	4	13

*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 realization rate for the Government Facilities MTP was driven by savings adjustments from desk review and onsite survey results.

Site #182335: Lighting fixture quantities were corrected from onsite findings where two fixtures were eliminated due to an overhead fan installed around the same time resulting in understated project savings. The change in savings resulted in slightly increased savings (kWh and kW realization rate =102 percent).

Site #132935: Two updates were made the HVAC project savings based on equipment findings found onsite including correcting pre-retrofit age of one unit and adding a 30-ton and 50-ton unit found to be eligible resulting in understated project savings. The change in savings resulted in increased energy and demand savings (kWh and kW realization rate =242 percent).

Site #176251: Lighting fixture types and quantities were corrected from onsite findings resulting in understated project savings. The change in savings resulted in slightly increased savings (kWh and kW realization rate =116 percent).

Site #170864: The building type and lighting fixture types and quantities were corrected from onsite findings resulting in understated project savings. The change in savings resulted in slightly increased savings (kWh realization rate =135 percent and kW realization rate =123 percent).

Site #172402: Updates were made to the pre-retrofit age of the HVAC equipment resulting in improved baseline efficiency and overstated project savings. The change in savings resulted in decreased energy and demand savings (kWh and kW realization rate =73 percent).

Site #179615: The HVAC equipment baseline condition was corrected from ROB to ER as the onsite contact reported the unit to be functioning at the time of replacement with only occasional issues cooling the space from unoccupied conditions in a timely manner. This correction resulted in understated project savings an increase in savings (kWh and kW realization rate =178 percent).



6. Impact Evaluation Results—Oncor...

Site #195946: The projects building type and lighting control type from occupancy sensors to switch only were corrected from onsite findings resulting in overstated project savings. The change in savings resulted in decreased savings (kWh and kW realization rate =71 percent).

Site #179546: The projects lighting fixture and control quantities had corrections made from onsite findings resulting in slightly overstated project savings. The change in savings resulted in slightly decreased savings (kWh realization rate =98 percent and kW realization rate =99 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and/or specifications) for all 30 sites that had desk reviews completed because sufficient documentation was provided for the sites. In particular, Oncor provided the EM&V team with the requested onsite inspection documentation. For these sites, we were able to use this documentation as verification of lighting fixture types and quantities as identified in the calculators. Since sufficient documentation was provided for 100 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

D. Small Business Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.1%	71	71	99.9%	0.1%	325,948	326,176	100.1%	MEDIUM

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
5	0	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 realization rate for the Open MTP was near 100 percent. There was only one adjustment made to the savings. For site #218055, re-creation of the online savings calculations from project details provided resulted in increased savings (kWh and kW realization rate =102 percent).

The EM&V team was not able to verify key inputs and assumptions (e.g., equipment state of operation) for one of five sites that had desk reviews completed because insufficient documentation was provided for the site. In particular, Oncor did not provide the EM&V team with the requested pre inspection field notes for the lighting fixtures. For this site, we were unable to verify the pre-lighting fixture operation. Since sufficient documentation was provided for 80 percent of the sampled sites, the uncertainty ranking for these estimates is MEDIUM.



6. Impact Evaluation Results—Oncor...

6.3 DETAILED FINDINGS—RESIDENTIAL

6.3.1 Residential standard offer

A. Home Energy Efficiency Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
21.9%	24,744	43,243	174.8%	43.8%	98,479,927	112,779,212	114.5%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
71	42	11	32

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

Evaluated savings for the Oncor Home Energy Efficiency (HEE) SOP were 43,243 kW and 112,779,212 kWh, with realization rates of 175 percent and 115 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak to claimed energy and peak savings made at three levels: data review (to check tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

i. Data review

The data review realization rates are 115 percent for kWh and 176 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722³⁷). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In all cases for this program, the savings were not updated in the tracking system to reflect the petition and contributed to the following realization rates for energy and demand:

- Infiltration reduction (101 percent, 222 percent)
- Ceiling insulation (101 percent, 246 percent)
- Duct Sealing (139 percent, 100 percent).

³⁷ Petition to approve revisions to residential deemed savings to incorporate winter peak demand impacts and update certain existing deemed savings values



6. Impact Evaluation Results—Oncor...

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. The EM&V team was not able to identify the drivers of the changes. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction and ceiling insulation.

ii. Desk review

The EM&V team identified discrepancies in two measures through this process: duct efficiency improvements, and air infiltration reductions. In one project, duct efficiency inputs did not match between the provided documentation and the tracking database; this was due to difference in the recorded pre-retrofit air leakage. In four projects, air infiltration inputs did not match between the provided documentation and the tracking database; in two cases, this was due to difference in the recorded pre-retrofit air leakage, in one case, this was due to difference in the recorded post-retrofit air leakage, and in one case, this was due to difference in the recorded square footage.

iii. Site visits

Site visits were conducted for 32 projects.³⁸ 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, natural 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.

Discrepancies beyond 20 percent were noted for 8 of the 19 homes that received a site visit after duct improvements were performed. In cases where discrepancies were noted, the site visit measured leakage was between 70 percent lower to 123 percent higher than reported. For one site, the cooling tons measured during the site visit did not align with that recorded in the tracking database.

Discrepancies beyond 10 percent were noted for 16 of the 26 homes that received a site visit after air sealing was performed. In cases where discrepancies were noted, the site visit measured infiltration was between 39 percent lower and 112 percent higher than reported. For six of these sites, the square footage measured during the site visit did not align with that recorded in the tracking database. For one of these sites, the heating system type measured during the site visit did not align with that recorded in the tracking database.

Discrepancies were also noted for one other measure: ceiling insulation. For four projects, the pre-retrofit R-value recorded during the site visit did not match that recorded in the tracking database. For two projects, the area treated recorded during the site visit did not match that recorded in the tracking database. For a third project, the heating system type recorded during the site visit did not match that recorded in the tracking database. For a fourth project, the pre-retrofit R-value and the area treated recorded during the site visit did not match that recorded in the tracking database.

³⁸ The EM&V team did not receive documentation to complete a desk review for two of the sites. For these sites, a realization rate was imputed from the desk reviews for remaining projects.



6. Impact Evaluation Results—Oncor...

iv. Documentation

The EM&V team requested documentation for 143 sites through the supplemental data request. Of these sites, documentation was provided for 166, and all 166 had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

B. Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
5.9%	6,600	12,371	187.5%	12.4%	27,815,914	35,009,110	125.9%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
23	21	9	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.

Evaluated savings for the Oncor’s Hard-to-Reach SOP were 12,371 kW and 35,009,110 kWh, with realization rates of 188 percent and 126 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

i. Data review

The data review realization rates are 113 percent for kWh and 180 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In all cases for this program, the savings were not updated in the tracking system to reflect the petition and contributed to the following realization rates for energy and demand:

- Infiltration reduction (105 percent, 229 percent)
- Ceiling insulation (101 percent, 218 percent)
- CFLs (100 percent, 125 percent)
- Duct Sealing (140 percent, 97 percent).



6. Impact Evaluation Results—Oncor...

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. The EM&V team was not able to identify the drivers of the changes. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction and ceiling insulation.

ii. Desk review

The EM&V team identified discrepancies in two measures through this process: duct efficiency improvements and CFL installations.

- In three projects, duct efficiency inputs did not match between the provided documentation and the tracking database; in one case, this was due to difference in the recorded pre-retrofit air leakage, in the others, it was due to differences in the recorded pre-retrofit and post-retrofit air leakage.
- For one project, the wattage ranges reported for CFL installations did not reflect project documentation.

iii. Site visits

Site visits were conducted for eight projects.³⁹ 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, natural 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.

Discrepancies beyond 20 percent were noted for one of the two homes that received a site visit after duct improvements were performed, while the remaining home could not have duct leakage verified during the site visit. In the case where a discrepancy was noted, the site-visit-measured leakages were 578 percent higher than reported.

Discrepancies beyond 10 percent were noted for one of the four 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. For the home where a discrepancy was noted, the site-visit-measured infiltration was 83 percent higher than reported.

Discrepancies were also noted for one other measure: ceiling insulation. For three projects, the pre-retrofit R-value recorded during the site visit did not match that recorded in the tracking database. In one case, auditors were unable to verify the heating system type and in another, the area treated for this measure could not be verified.

iv. Documentation

The EM&V team requested documentation for 25 sites through the supplemental data request. Of these sites, documentation was provided for 23 projects, and 23 projects had

³⁹ All of these sites had sufficient documentation to complete a desk review.



6. Impact Evaluation Results—Oncor...

sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

C. Residential Solar PV Installation Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
2.6%	2,891	2,894	100.1%	2.3%	5,157,153	5,208,725	101.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
16	19	2	6

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

Evaluated savings for the Residential Solar PV Installation SOP were 2,847 kW demand and 5,645,245 kWh energy, with realization rates of 100 percent for demand and 104 percent for energy.

The realization rates were driven by adjustments to claimed energy and peak savings made at five projects. Details on the adjustments are provided below.

Project ID #2013SPV - 2013 - 21077_176385: The project installed more capacity than the residential rebate limit of 10 kW. This additional capacity drove more savings and raised the project realization rate for both demand savings and annual energy savings. The desk review and on-site M&V both found realization rates of 125 percent.

Project ID #2013SPV - 2013 - 21117_180433: The PvWatts simulations used to estimate savings for this site used weather for Austin, even though the closest TMY2 city is Fort Worth. Additionally, the site installed a slightly lower capacity than expected and at a slightly different azimuth from expected. These changes drove realization rates to be different than one. The three arrays point east, south, and west so the aggregated demand savings are lower than the AC capacity due to lack of coincidence of peak array generation. No on-site M&V was done for this site. The desk review found realization demand and energy realization rates of 87 percent and 103 percent, respectively.

Project ID #2013SPV - 2013 - 21777_179516: The EM&V team was able to verify the installed system capacity ratings for this site based on inspection reports. This project used the PvWatts method to estimate savings, but the PvWatts summary sheet was not available for review. The desk review savings are based on PvWatts simulations using the capacity and configuration found in the desk reviews, which may or may not differ slightly from that used for the ex-ante estimates. The on-site savings are slightly lower (Demand kW Realization Rate = 1.02, Energy kWh Realization Rate = 0.95) since the on-site M&V found slightly lower tilt and more westerly facing panels. The desk review found demand energy realization rates of 106 percent and 100 percent, respectively.



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Project ID #2013SPV - 2013 - 24546_197798: The EM&V team was able to verify the installed system capacity based on the desk review. The system tilt, azimuth, and location match the entries for the ex-ante PvWatts simulations so annual savings are close to expectations. Evaluated demand savings are slightly lower than expected since the claimed demand savings were based on AC capacity and not peak simulated hourly generation. Because this system points east and not south, slightly less sunlight is available when the panel is pointing straight at the sun, lowering evaluated demand savings. No on-site M&V was done for this site. The desk review found demand energy realization rates of 97 percent and 89 percent, respectively.

Project ID #2013SPV - 2013 - 25533_221830: The PvWatts simulations used to estimate savings for this site used weather for Austin, even though the closest TMY2 city is Fort Worth. Additionally, the site installed a slightly lower capacity than expected and at a slightly different azimuth from expected. These changes drove realization rates to be different than one. The project has three arrays that point east, south, and west so the aggregated demand savings are lower than the AC capacity due to lack of coincidence of peak array generation. No on-site M&V was done for this site. The desk review found demand energy realization rates of 94 percent and 100 percent, respectively.

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 either inspection reports or on-site inspections, so the overall uncertainty ranking for inputs to this savings estimate is considered LOW.

Findings and Recommendations

Based on this research, the EM&V provides the following recommendations for consideration.

- The M&V method to calculate peak demand ex-post savings for projects that use PvWatts for estimating ex-ante savings is slightly different from the method the utility used to estimate ex-ante savings. The use of PvWatts to calculate savings is presented in TRM petition 40885 but the demand savings protocol is somewhat ambiguous. The M&V method used maximum simulated hourly output to evaluate peak demand savings. The utility used the rated AC capacity of the project to estimate demand savings. For many projects, this yielded very similar results. For some projects, especially those with multiple arrays, the results varied somewhat between the two methods. One way to improve estimation of demand savings using the PvWatts method would be to add the following the clarifications to the TRM or within utility documentation:
 - Add a bullet d1: “Annual savings should be calculated as the sum of simulated annual energy for all arrays present at the project.”
 - Add a bullet f after bullet e: “After exporting hourly savings to Excel, coalesce the output for each array into a single sheet. For the first array, paste the entire output into a worksheet. For any additional arrays, only paste a column of the hourly output for each array into a column in that one worksheet. For example, for a system with three arrays, there should be three columns of “AC Power (W)”. Add a column that sums each of the array output columns to determine what the project level hourly performance generation is. Determine the maximum of this column of aggregated hourly energy values. This maximum is the calculated demand savings for the project.”



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- Develop a template for peak demand savings for projects that use PvWatts to calculate savings to ensure uniform application of this method.
- The National Renewable Energy Lab (NREL) will be releasing an new version of PvWatts (V5) in mid-2014. This version will better reflect actual system performance and improvements in system efficiency over the past decade and will largely raise energy and demand estimates by 10 to 14 percent. This new version will also offer thin film as a discrete module technology choice and therefore may present a method to estimate savings for solar shingles. If possible, the updated version of PvWatts (V5) should be specified for all PY2015 projects using PvWatts to calculate savings.

D. Targeted Weatherization Low Income Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
1.0%	1,076	1,422	132.2%	1.3%	3,018,748	4,047,840	134.1%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
48	13	0	14

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

Evaluated savings for the Oncor's Targeted Low-Income program were 1,422 kW and 4,047,840 kWh, with realization rates of 132 percent and 134 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

i. Data review

The data review realization rates are 113 percent for kWh and 122 percent for kW. This is due in part to the EM&V team using the deemed savings reflected in TRM Version 1.0 Volume 2. In several instances, the tracking system savings were not updated to reflect the TRM and contributed to the following realization rates for energy and demand:

- Infiltration reduction (100 percent, 147 percent)
- Ceiling insulation (100 percent, 137 percent)
- CFLs (98 percent, 126 percent)



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- Water heating measures (260 percent, 373 percent)
- Duct Sealing (212 percent, 138 percent).

Although TRM Version 1.0 Volume 2 includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement), the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the table below.⁴⁰ These assumptions result in a conservative estimate of savings as they generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (260 percent for kWh and 373 percent for kW), these measure comprise a small percentage (≤ 1 percent) of the total program savings, so the overall impact on the program's realization rate is minimal.

Table 6-6. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. The EM&V team was not able to identify the drivers of the changes. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for window AC and CFLs.

Additionally, there were two infiltration reduction projects where the 10 percent minimum reduction was not achieved after accounting for the initial infiltration valued capped at four times the home square footage. No evaluated savings were reported for these projects.

ii. Desk review

The EM&V team identified discrepancies in ten measures through this process: ceiling insulation, CFL installations, duct efficiency improvements, wall insulation, windows, water heater measures, air infiltration reductions, solar screens, central air conditioners, and heat pumps.

⁴⁰ These assumed values were provided by Frontier.



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- In four projects, ceiling insulation inputs did not match between the provided documentation and the tracking database; in one case, this was due to difference in the recorded R-value, in the others, this was due to difference in the recorded heating system type.
- For five projects, the quantity or wattage ranges reported for CFL installations did not reflect project documentation.
- In six projects, duct efficiency inputs did not match between the provided documentation and the tracking database; in one case, this was due to difference in the recorded cooling tons and heating system type, in one case, this was due to difference in the recorded heating system type, in the others, it was due to differences in the recorded pre-retrofit and post-retrofit air leakage.
- In one project, wall insulation inputs did not match between the provided documentation and the tracking database; this was due to difference in the recorded square footage of wall insulation installed.
- For four projects, the window inputs did not match between the provided documentation; in one case, this was due to difference in the recorded heating system type, in the others, this was due to difference in the recorded area of windows installed.
- For one project, the water heater measures did not match between the provided documentation and the tracking database; this was due to the difference in the recorded water heater jacket and pipe wrap.
- In five projects, air infiltration inputs did not match between the provided documentation and the tracking database; in three cases, this was due to difference in the recorded pre-retrofit air leakage, in two cases, this was due to difference in the recorded post-retrofit air leakage, and in one case, this was due to difference in the recorded pre-retrofit and post-retrofit air leakage.
- For one project, the square footage of installed solar screens did not match that recorded in the tracking system.
- In one project, heat pump inputs did not match between the provided documentation and the tracking database; this was due to difference in the recorded SEER.

iii. Site visits

Site visits were conducted for 14 projects.⁴¹ 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, natural variation is expected. For infiltration measures, variation within 10 percent is expected for blower door test results.

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 site visit measured infiltration was between 18 percent and 42 percent higher than reported. For one site, the square footage measured during the site visit was lower than that recorded in the

⁴¹ All of these sites had sufficient documentation to complete a desk review.



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tracking database.

Discrepancies were also noted for CFLs, ceiling insulation, windows, the installation of air conditioners, and solar screen measures.

- For three sites, the quantity or wattage of CFLs found during the site visits did not align with those recorded in the tracking database.
- For two sites, the initial R-value of ceiling insulation or the square footage insulated found during the site visit did not align with that recorded in the tracking database.
- For two sites, the square footage of installed windows did not match that recorded in the tracking database.
- At one site, the SEER value of the air conditioner reported during the site visit did not align with that recorded in the tracking database.
- At one site, the square footage of installed screens did not match that recorded in the tracking database.

iv. Documentation

The EM&V team requested documentation for 53 sites through the supplemental data request. Of these sites, documentation was provided for 53 projects, and 53 projects had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

6.3.2 Residential market transformation

A. Air Conditioning Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.8%	879	879	100.0%	1.2%	2,686,464	2,686,464	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
35	45	9	18

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

Evaluated savings for Oncor’s Air Conditioning 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. What the EM&V team received for each project was the Rebate



6. Impact Evaluation Results—Oncor...

Claim Form, AHRI Certificate, and measure attribute files. This project documentation included key parameter information (e.g., SEER and tonnage), allowing the EM&V team to calculate savings and compare to the Deemed Savings Manual. 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). As a result, the uncertainty ranking for both the kW and kWh savings is LOW.

The EM&V team did notice that neither the Oncor Rebate Claim Form nor customer invoice indicated that all work was completed per project specifications. While Oncor is removing this program from its mix of energy efficiency programs in PY2014, should Oncor decide to offer a similar program in the future, the program should be sure to include this type of documentation for each project.

6.4 DETAILED FINDINGS—LOAD MANAGEMENT

6.4.1 Commercial Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
48.8%	55,000	72,875	132.5%	0.1%	225,509	225,509	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
399	0	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 PY2013 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 399 reported program participants participating in 2013 and the evaluation team was able to verify savings for 399 participants. There was one scheduled event called on May 16, 2013.

The evaluated demand savings for the Oncor Commercial Load Management Standard Offer Program were 72,876 kW. Oncor capped the demand savings at 55,000 kW to be conservative since that's the contracted load. They called only a single scheduled event and no unscheduled events. The EM&V Team's estimate of savings is based on the single scheduled event.

The evaluated energy savings for the Oncor Commercial Load Management Standard Offer Program were 225,509 kWh. Oncor reports 225,509 in energy savings as well.

The realization rate for kW was 133 percent, but since no unscheduled events were called, the evaluation team does not know with certainty that 72,876 kW of load relief would actually be available for an unscheduled event. The realization rate for kWh is 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 PY2013 were slightly higher than claimed savings resulting in healthy realization rates over 100 percent for both demand (kW) and energy (kWh) savings.

For both the Residential SOP and HTR programs, the higher realization rates were mostly driven by adjustments to claimed energy and peak savings to be consistent with TRM 1.0. In particular, the duct sealing measures were not updated using the winter peak demand savings calculation. Adjustments were also made to savings based on differences in values for air infiltration and duct efficiency improvements based on on-site visits.

In addition, the evaluation of the Residential SOP’s program identified that for some projects infiltration control and ceiling insulation did not reflect the approved savings. Adjusting the savings to account for these values increased the demand savings for infiltration control by 163 percent, and demand savings for ceiling insulation by 135 percent.

Last, savings for Residential SOP were adjusted based on review of program documentation against the tracking database as well as findings from on-site visits. There were several instances of incorrect tracking for this program. No discrepancies were identified in between the tracking system and desk reviews for the HTR SOP.

Table 7-1 shows the claimed and evaluated demand savings for Sharyland’s portfolio and broad customer sector/program categories for PY2013.

Table 7-1. Sharyland Program Year 2013 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kw)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kw)	Precision at 90% Confidence
Total Portfolio		2,668	2,702	101.3%	2.7%
Residential Sector	13.2%	351	385	109.6%	18.7%
Load Management	86.8%	2,317	2,317	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



7. Impact Evaluation Results—Sharyland...

Table 7-2 shows the claimed and evaluated energy savings for Sharyland’s portfolio and broad customer sector/program categories for PY2013.

Table 7-2. Sharyland Program Year 2013 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		1,007,593	1,217,332	120.8%	26.4%
Residential Sector	99.5%	1,002,959	1,212,698	116.2%	26.5%
Load Management	0.5%	4,634	4,634	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 qualitative rating of low, medium, and high associated with the uncertainty of the verification effort based on program documentation received from the utility. The most favorable rating for uncertainty of “low” was given when thorough and detailed documentation was received to verify the savings. The “high” uncertainty rating was given when the EM&V team received primarily project-level savings calculations without supporting documentation to verify the inputs in the calculations. It is important to note that this uncertainty rating is specific to program documentation received to verify claimed savings and is not an indicator of the reasonableness or accuracy of savings estimates.

Based on these uncertainty rankings, the sufficiency of program documentation provided to the EM&V team to complete a third-party due diligence review of evaluated demand savings is indicated as good, fair, or limited. For the utility program documentation score, the ranking of “good” was given if 90 percent or more of the evaluated savings estimates received a ranking of low or medium uncertainty due to program documentation received as indicated in detailed program findings. A ranking of “fair” was given if 70 percent–89 percent of the evaluated savings estimates received a ranking of low or medium. A ranking of “limited” was given if less than 70 percent of savings received an uncertainty ranking of low or medium.

In general, a ranking of “good” indicates the utility has established processes to collect sufficient documentation to verify savings; a ranking of “fair” also indicates established processes with some areas of improvements identified; and a ranking of “limited” indicates program documentation improvements across more individual programs and/or high savings programs have been identified. The overall program documentation score for Sharyland was good for kW and good for kWh. As program documentation recommendations for the PY2012



7. Impact Evaluation Results—Sharyland...

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 PY2013.

7.1.2 Cost-effectiveness results

Sharyland’s overall portfolio had a cost-effectiveness of 4.11.

The most cost-effective program was the Residential SOP. The least cost-effective program was the Load Management SOP. Several programs had benefit-cost ratios of 0 since they expended funds in 2013 but did not generate any savings. All programs that claimed savings passed cost-effectiveness testing.

The lifetime cost of PY2013 savings was \$0.013 per kWh and \$11.61 per kW.

Table 7-3. Sharyland Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Total Portfolio	3.52	4.11
Total Portfolio excluding low-income programs	3.52	4.11
Commercial Sector	0.00	0.00
Commercial SOP	0.00	0.00
Customized Commercial MTP	0.00	0.00
Residential Sector	6.25	7.40
Residential SOP	7.86	10.28
Hard-to-Reach SOP	4.88	4.96
Load Management	1.58	1.58
Load Management SOP	1.58	1.58
Pilots	0.00	0.00
Behavioral Pilot Program	0.00	0.00



7. Impact Evaluation Results—Sharyland...

7.2 DETAILED FINDINGS—RESIDENTIAL

7.2.1 Residential standard offer programs

A. Residential Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
6.8%	182	253	138.6%	59.2%	596,033	768,823	129.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
17	14	1	6

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

Evaluated savings for the Sharyland Residential SOP were 253 kW and 768,823 kWh, with realization rates of 139 percent and 129 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

i. Data review

The data review realization rates are 121 percent for kWh and 133 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is not officially effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No 41722⁴²). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation. The impact of this difference is a realization rate of 203 percent for energy and 123 percent for demand. This is the largest driver of the program’s data review realization rate.

In addition, 20 instances of infiltration control and 102 instances of ceiling insulation do not appear to have been updated to Project No. 41722, where the demand savings for infiltration

⁴² Petition to approve revisions to residential deemed savings to incorporate winter peak demand impacts and update certain existing deemed savings values



7. Impact Evaluation Results—Sharyland...

control and ceiling insulation have realization rates of 163 percent and 135 percent, respectively (there is no impact on the energy savings).

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement) based on Project No. 41722. However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the table below.⁴³ These assumptions result in a conservative estimate of savings as they generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (252 percent for kWh and 308 percent for kW), these measures comprise a small percentage (<1 percent) of the total program savings, so the overall impact on the program’s realization rate is minimal.

Table 7-4. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates.

ii. Desk review

The EM&V team identified discrepancies in three measures through this process—CFL installations, water heater measures, and duct efficiency improvements. For seven projects, the quantity or wattage ranges reported for CFL installations did not reflect project documentation. For one project, the water heater measures did not match between the provided documentation and the tracking database; this was due to the difference in the recorded pipe wrap. In one project, duct efficiency inputs did not match between the provided

⁴³ These assumed values were provided by Frontier.



7. Impact Evaluation Results—Sharyland...

documentation and the tracking database; this was due to difference in the recorded pre-retrofit air leakage.

iii. Site visits

Site visits were conducted for six projects. Due to the nature of blower door and Duct Blaster tests, natural 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 tests. Discrepancies beyond 20 percent were noted for two of the three homes that received a site visit after duct improvements were performed. In cases where discrepancies were noted, the site visit measured leakage was 58 percent to 60 percent lower than reported.

Discrepancies beyond 10 percent were noted for one home that received a site visit after air sealing was performed. In this case, the site visit measured infiltration was between 15 percent lower than reported.

Discrepancies were also noted for water heater measures and CFLs. At one site, the quantity of water heater pipe wrap found during the site visits did not align with those recorded in the tracking database. For one site, the number of CFLs noted during the site visits were fewer than that recorded in the tracking database.

iv. Documentation

Desk reviews were completed for 17 projects, with documentation requested for a total of 19 sites through the supplemental data request. Of these sites, documentation was provided for 20, and 19 had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

B. Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
6.3%	168	132	78.1%	40.4%	406,926	443,875	109.1%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
7	5	1	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.

Evaluated savings for the Sharyland Hard-to-Reach SOP were 132 kW and 443,875 kWh, with realization rates of 78 percent and 109 percent for demand and energy, respectively.



7. Impact Evaluation Results—Sharyland...

The realization rates were driven by adjustments to claimed energy and peak savings made at three levels—data review (to check tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

i. Data review

The data review realization rates are 122 percent for kWh and 104 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is not officially effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722).

As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation. The impact of this difference is a realization rate of 200 percent for energy and 121 percent for demand. This is the largest driver of the program's data review realization rate.

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement) based on Project No. 41722. However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the table below.⁴⁴ These assumptions result in a conservative estimate of savings as they generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (177 percent for kWh and 434 percent for kW), these measures comprise a small percentage (approximately 1 percent) of the total program savings, so the overall impact on the program's realization rate is minimal.

⁴⁴ These assumed values were provided by Frontier.



7. Impact Evaluation Results—Sharyland...

Table 7-5. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates.

ii. Desk review

No discrepancies were identified by the EM&V team through this review.

iii. Site visits

Site visits were conducted for two projects.⁴⁵ 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, natural 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.

Both of the homes that received a site visit after duct improvements were performed could not have duct leakage verified during the site visit. For one home, the heating system type could not be verified during the site visit.

A discrepancy beyond 10 percent was noted for the one home that received a site visit after air sealing was performed. For this home, the site-visit-measured infiltration was 23 percent higher than reported. The infiltration measured during the site visit represents a reduction in air leakage of less than 10 percent, and therefore no savings were awarded.

⁴⁵ Each of these sites had sufficient documentation to complete a desk review.



7. Impact Evaluation Results—Sharyland...

iv. Documentation

Desk reviews were completed for seven projects, with documentation requested for a total of 14 sites through the supplemental data request. Of these sites, documentation was provided for 15, and 15 had sufficient documentation for review. Since sufficient documentation was provided for more than 90% of the sampled sites, the uncertainty ranking for these estimates is LOW.

7.3 DETAILED FINDINGS—LOAD MANAGEMENT

7.3.1 Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
86.8%	2,317	2,317	100.0%	0.5%	4,634	4,634	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
3	1	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 PY2013 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 three reported program participants participating in 2013 but the evaluation team could only verify savings for two participants. The evaluation team received work papers and interval load data for only two participants but this appeared to account for all the reported savings. There was one event called during the summer of 2013.

Evaluated savings for the Sharyland Load Management Standard Offer program were 2,317 kW and 4,634 kWh. The program therefore received a 100 percent realization for both energy and demand savings.



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

For both demand and energy savings, residential sector evaluated savings were less than claimed savings, resulting in overall portfolio realization rates of 95.9 percent for kW and 94.4 percent for kWh. The residential sector downward adjustments were primarily resulting from RSOP on-site M&V findings affecting evaluated savings for air infiltration reduction and duct efficiency improvement measures. These resulted in RSOP realization rates near 72 percent. The other residential programs, HTR and Home\$avers, had realization rates reasonably close to 100 percent.

The commercial sector evaluated savings are higher than claimed savings for both energy and demand savings, resulting in a 106.0 percent kW realization rate and a 100.0 percent kWh realization rate. Adjustments were made throughout sampled commercial projects based on on-site M&V and desk review findings for issues such as fixture count and quantity, measure operation, site operating hours and weather region. The CSOP realization rates were somewhat lower than 100 percent, but both of the CMTP programs' realization rates were somewhat higher than 100 percent. The Pilot category had adjusted savings for the Appliance Rebate pilot based on desk reviews and the Small Business pilot based on on-site M&V findings.

The load management evaluated savings matched the claimed savings exactly.

Table 8-1 shows the claimed and evaluated demand savings for SWEPCO's portfolio and broad customer sector/program categories for PY2013.



8. Impact Evaluation Results—Southwestern Electric Power Company...

Table 8-1. SWEPCO Program Year 2013 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kw)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kw)	Precision at 90% Confidence
Total Portfolio		14,066	13,542	96.3%	4.3%
Commercial Sector	15.0%	2,108	2,234	106.0%	10.0%
Residential Sector	26.1%	3,676	3,008	81.8%	17.9%
Load Management*	54.7%	7,698	7,698	100.0%	0.0%
Pilots	4.2%	585	602	102.9%	1.2%

* 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 PY2013.

Table 8-2. SWEPCO Program Year 2013 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		18,774,990	17,750,039	94.5%	15.9%
Commercial Sector	42.3%	7,949,337	8,021,249	100.9%	24.9%
Residential Sector	45.2%	8,478,843	7,538,643	88.9%	26.5%
Load Management*	0.2%	45,640	45,640	100.0%	0.0%
Pilots	12.3%	2,301,170	2,144,506	93.2%	1.7%

* 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.**



8. Impact Evaluation Results—Southwestern Electric Power Company...

In program-level realization rates, we have also included a qualitative rating of low, medium, and high associated with the uncertainty of the verification effort based on program documentation received from the utility. The most favorable rating for uncertainty of “low” was given when thorough and detailed documentation was received to verify the savings. The “high” uncertainty rating was given when the EM&V team received primarily project-level savings calculations without supporting documentation to verify the inputs in the calculations. It is important to note that this uncertainty rating is specific to program documentation received to verify claimed savings and is not an indicator of the reasonableness or accuracy of savings estimates.

Based on these uncertainty rankings, the sufficiency of program documentation provided to the EM&V team to complete a third-party due diligence review of evaluated demand savings is indicated as good, fair, or limited. For the utility program documentation score, the ranking of “good” was given if 90 percent or more of the evaluated savings estimates received a ranking of low or medium uncertainty due to program documentation received as indicated in detailed program findings. A ranking of “fair” was given if 70 percent–89 percent of the evaluated savings estimates received a ranking of low or medium. A ranking of “limited” was given if less than 70 percent of savings received an uncertainty ranking of low or medium. In general, a ranking of “good” indicates the utility has established processes to collect sufficient documentation to verify savings; a ranking of “fair” also indicates established processes with some areas of improvements identified; and a ranking of “limited” indicates program documentation improvements across more individual programs and/or high savings programs have been identified. The overall program documentation score for SWEPCO was good for kW and fair for kWh. As program documentation recommendations from 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 PY2013.

8.1.2 Cost-effectiveness results

SWEPCO’s overall portfolio had a cost-effectiveness of 3.02 or 3.27 excluding low-income programs.

The more cost-effective programs were Commercial SOP and Commercial Solutions MTP. The less cost-effective programs were Residential Solar PV and Home\$avers, which are not cost-effective, as well as some pilot programs. Pilot programs are not required to pass cost-effectiveness until the second year of operation, and the Appliance Rebate pilot is already planned to be discontinued. The Home\$avers program applies the savings-to-investment ratio (SIR) since it is a low income program. The SIR uses an average customer electric rate in order to monetize the program’s benefits, and in 2013 the customer rate was significantly lower than in 2012, dropping from \$0.116/kWh to \$0.086/kWh.

The lifetime cost of PY2013 evaluated savings was \$0.018 per kWh and \$14.45 per kW.

Table 8-3. SWEPCO Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Total Portfolio	3.23	3.02
Total Portfolio excluding low-income programs	3.50	3.27



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Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Commercial Sector	3.88	3.95
Commercial SOP	5.20	5.06
SCORE MTP	3.16	3.23
Commercial Solutions MTP	3.63	4.11
SMART Source Solar PV MTP (Nonresidential)	1.57	1.57
Residential Sector	4.18	3.60
Residential SOP	5.00	3.49
Hard-to-Reach SOP	3.58	4.11
SMART Source Solar PV MTP (Residential)	0.95	0.94
Low-Income	0.84	0.81
Home\$avers	0.84	0.81
Load Management	1.48	1.48
Load Management SOP	1.48	1.48
Pilots	1.98	1.87
CoolSaver A/C Tune-up MTP	1.06	1.06
ENERGY STAR Appliance Rebate Pilot MTP	0.75	0.72
Small Business Direct Install Pilot MTP	2.62	2.45

8.2 DETAILED FINDINGS—COMMERCIAL

8.2.1 Commercial Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
7.2%	1,019	1,005	98.6%	23.1%	4,334,201	4,212,844	97.2%	HIGH



8. Impact Evaluation Results—Southwestern Electric Power Company...

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
31	9	5	7

*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 SWEPCO CSOP were lower than the claimed savings taken from the program tracking system, resulting in realization rates lower than 100 percent for both demand and energy savings. Evaluated realization rates for the SWEPCO CSOP were 97 percent for energy savings and 99 percent for demand savings.

The evaluated realization rates were driven by adjustments made during the desk review and on-site verification process. A total of nine projects had realization rates that were not equal to 100 percent and were adjusted. These adjusted realization rates ranged from 61 percent to 103 percent for both energy and demand. From the nine projects with adjusted realization rates, five projects were found to be major drivers for the lower evaluated realization rates, which 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 #338960: The reported building type for this project was a 24-hour retail store but based on the on-site visit and information gained about hours of operation, the building type was changed to a non-24 hour retail store. This resulted in a 15 percent drop in energy savings, providing an 85 percent energy realization rate in the on-site verification process. The demand savings were unchanged. The energy and demand realization rates had not changed from 100 percent during the desk review process because the building type change was not identified at that time, due to insufficient documentation.

Project ID #616679: The reported building type for this lighting project was a refrigerated warehouse. However, after reviewing the facility type and looking up the address online, the facility was found to have an SIC code of “4225 – General Warehousing and Storage.” Therefore, the savings calculations were modified based on a “Non-Refrigerated Warehouse” building type. Additionally, fixture counts were adjusted for one record based on the post-verification inspection forms provided. The evaluated desk review energy and demand realization rate for this project is 90 percent. No on-site verification was performed for this site.

Project ID #338965 & #338966: These two projects involved lighting replacements. The EM&V team found that the calculator savings did not match the reported tracking savings for these projects. Therefore, the evaluated savings were adjusted to match the calculator savings. The evaluated desk review energy and demand realization rate for project ID #338965 is 87 percent and for project ID #338966 is 61 percent. No on-site verification was performed at either of these sites.

Project ID #338961: Several discrepancies were identified during the on-site visit. The variations included differences in ballast factors and fixture counts, which resulted in an



8. Impact Evaluation Results—Southwestern Electric Power Company...

increase in savings for the project and an overall project energy and demand realization rate of 109 percent. The changes in fixture configurations and counts were not reported in the post-installation verification forms provided to the EM&V team, and therefore, were not captured by the desk review.

Table 8-4. Commercial Standard Offer Program Documentation Quality Assessment

Sufficient Documentation	Insufficient Documentation	No Documentation	Completed Desk Reviews
10	21	0	31

As shown in Table 8-4, the documentation provided was sufficient for only about 30 percent of the projects reviewed. Without adequate documentation, the EM&V team was not able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (wattages, efficiencies, ballast factors, etc.). Therefore, documentation for the SWEPCO CSOP evaluation has been assigned an uncertainty rating of HIGH, as sufficient documentation was provided for fewer than 70 percent of the projects in the sample.

8.2.2 Commercial Market Transformation Programs

A. SCORE Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
4.3%	609	625	102.6%	9.0%	1,680,415	1,713,855	102.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
6	6	1	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.

The realization rate for the SCORE MTP was driven by savings adjustments from onsite survey and desk review results for one sites. For site #161470, the efficiency rating of the chiller was determined to be higher than reported resulting in understated project savings. The change in savings resulted in increased savings (site #161470 kWh realization rate equal to 121 percent and kW realization rate equal to 120 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 uncertainty ranking for these estimates is LOW.



8. Impact Evaluation Results—Southwestern Electric Power Company...

B. Commercial Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
2.5%	352	477	135.6%	9.0%	1,689,529	1,849,358	109.5%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
6	5	4	6

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

Evaluated savings for the Commercial Solutions MTP were 477 kW and 1,849,358 kWh, with realization rates of 136 percent and 110 percent, respectively.

The realization rate for the Commercial Solutions MTP was mainly driven by savings adjustments from onsite survey results. For site #160914, lighting fixtures were found onsite with premium efficiency ballasts not accounted for in claimed savings and the building type was corrected resulting in understated project savings. The change in savings resulted in increased savings (site #160914 kWh realization rate equal to 114 percent and kW realization rate equal to 106 percent). For site #236691, the lighting fixtures as identified in the claimed savings calculations did not match the manufacturer's data resulting in overstated project savings. The change in savings resulted in a slight decrease in savings (site #236691 kWh and kW realization rate equal to 99 percent). For site #211240, the weather region as identified in the claimed calculations did not match those of the site and operating hours were adjusted due to fans found to be thermostatically controlled. These findings resulted in overstated project savings. The change in savings resulted in decreased savings (site #211240 kWh realization rate equal to 89 percent and kW realization rate equal to 100 percent). For site #213269, the fans were found to be controlled via thermostat. These findings resulted in overstated energy project savings and no change to the demand savings. The change in savings resulted in decreased energy savings (site #213269 kWh realization rate equal to 90 percent and kW realization rate equal to 100 percent). For site #213204, retrofit lighting fixtures were found onsite that had been accounted for as "removed" in the claimed savings and the building type was corrected resulting in understated energy and overstated demand project savings. The change in savings resulted in increased energy and decreased demand savings (site #213204 kWh realization rate equal to 111 percent and kW realization rate equal to 83 percent). For site #161403, the efficiency of the HVAC equipment found onsite was corrected including a unit that was initially found ineligible in the claimed savings resulting in significantly understated project savings. The change in savings resulted in increased savings (site #161403 kWh realization rate equal to 1,793 percent and kW realization rate equal to 1,848 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 uncertainty ranking for these estimates is LOW.



8. Impact Evaluation Results—Southwestern Electric Power Company...

C. SMART Source Solar PV Pilot Market Transformation Program (Commercial)

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.9%	127	127	100.0%	1.3%	245,192	245,192	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
3	0	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.

Evaluated savings for the SMART Source Solar PV Pilot MTP (Commercial) were 127 kW demand and 245,192 kWh annual energy with realization rates of 100 percent for both demand and energy.

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 desk reviews of three installations. Evaluated savings estimates above 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 LOW.

8.3 DETAILED FINDINGS—RESIDENTIAL

8.3.1 Residential Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
15.0%	2,110	1,446	68.6%	27.0%	5,076,861	3,556,341	70.1%	LOW



8. Impact Evaluation Results—Southwestern Electric Power Company...

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
29	20	5	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.

Evaluated savings for the RSOP were 1,446 kW and 3,556,341 kWh, with realization rates of 69 percent and 70 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

A. Data review

The data review realization rates are 108 percent for kWh and 96 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722⁴⁶). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the methodology from the winter peak demand savings calculation. The impact of this difference is a realization rate of 121 percent for energy and 86 percent for demand. This is the largest driver of the program’s data review realization rate.

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction.

B. Desk review

Desk reviews were completed for 29 projects. The EM&V team identified discrepancies in two measures through this process: air infiltration and ceiling simulation. For two projects, the infiltration inputs did not match between the provided documentation and the tracking database; in one case, this was due to differences in the reported square footage and infiltration reduction, in the other, this was due to difference in the recorded infiltration reduction. In one project, ceiling insulation inputs did not match between the provided

⁴⁶ Petition to approve revisions to residential deemed savings to incorporate winter peak demand impacts and update certain existing deemed savings values



8. Impact Evaluation Results—Southwestern Electric Power Company...

documentation and the tracking database, this was due to difference in the recorded R-value and difference in the recorded square footage.

C. Site visits

Site visits were conducted for eight projects, all of which received desk reviews where sufficient documentation was provided. All of these sites had sufficient documentation to complete a desk review. 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, natural 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.

Discrepancies beyond ± 20 percent were noted for five of the eight homes that received a site visit after duct improvements were performed, while two of the remaining homes could not have duct leakage verified during the site visit. In cases where discrepancies were noted, the site-visit-measured leakage was 26 percent to 513 percent higher than reported. For two of these sites, the heating system type measured during the site visit did not align with that recorded in the tracking database. For one site, the cooling tonnage measured during the site visit was lower than that recorded in the tracking database.

Discrepancies beyond ± 10 percent were noted for five of the eight homes that received a site visit after air sealing was performed, while the infiltration level in two of the remaining homes could not be verified during the site visit. In cases where discrepancies were noted, the site-visit-measured infiltration was between 52 percent lower and 40 percent higher than reported. For two of these sites, the heating system type measured during the site visit did not align with that recorded in the tracking database. For one site, the square footage measured during the site visit was lower than that recorded in the tracking database.

D. Documentation

Documentation was requested for a total of 82 sites through the supplemental data request. Of these sites, documentation was provided for 84, and 78 had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

8.3.2 SMART Source Solar PV Pilot Market Transformation Program (Residential)

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.3%	43	43	99.4%	0.4%	83,786	83,283	99.4%	LOW



8. Impact Evaluation Results—Southwestern Electric Power Company...

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
2	0	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.

Evaluated savings for the SMART Source Solar PV Pilot MTP (Residential) were 43 kW and 83,786 kWh, with realization rates of 100 percent for both demand and energy.

The evaluated realization rates were driven by adjustments made during the desk review process. Evaluated savings matched claimed or reported savings from program administrators for one project but needed to be adjusted for differences between installed and tracked system capacity for the other reviewed project (a total of two projects were reviewed). Evaluated savings estimates above 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 project specific savings adjustment that was the major driver of the program level realization rate is listed below:

Project ID # APV0161: The project planned to install 44 230W solar PV panels for a planned capacity of 10.12 kW_{DC}. The project changed to 40 250W solar PV panels for an actual capacity of 10.0 kW_{DC}. This lowered the project realization rate to 98.8 percent for both demand savings and annual energy savings.

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 LOW.

8.3.3 Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
9.9%	1,390	1,389	99.9%	15.9%	2,979,590	3,570,740	119.8%	LOW



8. Impact Evaluation Results—Southwestern Electric Power Company...

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
7	7	6	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.

Evaluated savings for the Hard-to-Reach SOP were 1,389 kW and 3,570,740 kWh, with realization rates of 100 percent and 120 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

A. Data review

The data review realization rates are 129 percent for kWh and 106 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation. The impact of this difference is a realization rate of 184 percent for energy and 113 percent for demand. This is the largest driver of the program's data review realization rate.

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement) based on Project No. 41722. However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in Table 8-5.⁴⁷ These assumptions result in a conservative estimate of savings as they are generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (84 percent for kWh and 231 percent for kW), these measure comprise a small percentage (<3 percent) of the total program savings, so the overall impact on the program's realization rate is minimal.

Table 8-5. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches

⁴⁷ Assumed values provided by Frontier.



8. Impact Evaluation Results—Southwestern Electric Power Company...

Measure	Parameter	Assumed Value
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, wall insulation, and ceiling insulation.

Additionally, there was one infiltration reduction project where the 10 percent minimum reduction was not achieved after accounting for the initial infiltration valued capped at four times the home square footage. No evaluated savings were reported for this project.

B. Desk review

Desk reviews were completed for five projects. The EM&V team identified only one discrepancy through this process: for one project, while project documentation indicated that two low-flow showerheads were installed, program tracking data reflected only one.

C. Site visits

Site visits were conducted for four projects.⁴⁸ 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, natural 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.

Discrepancies beyond ± 20 percent were noted for one home where duct improvements were performed. Through the site inspection, two factors were identified that resulted in zero savings applied to this measure installation. First, pressurization was not sufficiently achieved, indicating a lack of sealing. Second, the home owner indicated that no work had been done to the duct system because the attic could not be access to her knowledge;

⁴⁸ All of these sites had sufficient documentation to complete a desk review.



8. Impact Evaluation Results—Southwestern Electric Power Company...

specifically, the attic could not be physically accessed without cutting into it from the interior or roof.⁴⁹

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 site-visit-measured infiltration was between 14 percent and 66 percent higher than reported.

D. Documentation

Documentation was requested for a total of 14 sites through the supplemental data request. Of these sites, documentation was provided for 14, and 14 had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent, the uncertainty ranking for these estimates is LOW.

8.3.4 Home\$avers Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.9%	133	129	97.4%	1.8%	338,607	328,279	97.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
18	8	0	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.

Evaluated savings for the SWEPCO the Home\$avers Program were 129 kW and 328,279 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

⁴⁹ During the finalization of the report, the EM&V team discovered that data from measures with zero savings through the site visits were not included in the realization rate calculation. Due to the timing of the report, this correction was not included in this report.



8. Impact Evaluation Results—Southwestern Electric Power Company...

A. Data review

The data review realization rates are 101 percent for kWh and 101 percent for kW. This is due in part to the EM&V team using the deemed savings reflected in TRM Version 1.0 Volume 2.

For example, TRM Version 1.0 Volume 2 includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement. However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in Table 8-6.⁵⁰ These assumptions result in a conservative estimate of savings as they are generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (108 percent for kWh and 118 percent for kW), these measure comprise a small percentage (<2 percent) of the total program savings, so the overall impact on the program’s realization rate is minimal.

Table 8-6. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition, the remaining lifetime table used to calculate claimed savings for refrigerators differs from the values used by the EM&V team and those presented within the TRM Version 1.0 Volume 2. The impact of this difference is a realization rate of 105 percent for energy and 105 percent for demand.

Finally, concerning window AC measures, claimed savings used a different methodology from the TRM Version 1.0 Volume 2 that accounted for weather zone when determining operating hours of the unit (a single value is uniformly assumed in the TRM). Additionally, claimed savings appear to use a different baseline for replaced units over 12 years of age, which again differs from the savings calculations in the TRM. The impact of this difference is a realization rate of 155 percent for energy and 110 percent for demand.

⁵⁰ Assumed values provided by Frontier.



8. Impact Evaluation Results—Southwestern Electric Power Company...

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for ceiling insulation.

Lastly, no demand savings were claimed for ceiling fans; however, the overall impact of this change is <0.1 kW.

B. Desk review

Desk reviews were completed for 18 projects. No discrepancies were identified by the EM&V team through this review.

C. Site visits

Site visits were conducted for eight projects.⁵¹ 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, natural variation is expected. For infiltration measures, variation within ± 10 percent is expected for blower door test results.

Discrepancies beyond ± 10 percent were noted for one of the two homes that received a site visit after air sealing was performed; the infiltration level in the other home could not be verified during the site visit. In the case where discrepancies were noted, the site-visit-measured infiltration was 26 percent higher than reported.

Discrepancies were also noted for two other measures: CFLs and solar screens. For three projects, the quantity of CFLs found during the site visits did not align with those recorded in the tracking database; in one case, it was noted that several of the installed CFLs had burned out, accounting for some of this difference. At one site, the square footage of installed screens did not match that recorded in the tracking database.

D. Documentation

Documentation was requested for a total of 20 sites through the supplemental data request. Of these sites, documentation was provided for 19, and 18 had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

⁵¹ One of these sites had insufficient documentation to complete a desk review, for which a realization rate was imputed from the desk reviews for remaining projects.



8. Impact Evaluation Results—Southwestern Electric Power Company...

8.4 DETAILED FINDINGS—LOAD MANAGEMENT

8.4.1 Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
54.7%	7,698	7,698	100.0%	0.2%	45,640	45,640	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
10	4	0	0

* Confidence intervals are not reported at the utility program level, however census reviews are completed for load management programs.

The PY2013 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 10 reported program participants in 2013 and this is the number of participants for which the evaluation team received work papers and interval load data. There were two events called during the summer of 2013.

Evaluated savings for the SWEPCO Load Management Standard Offer Program were 7,698 kW and 45,608 kWh. The realization rate for kW was 100 percent and the realization rate for kWh was 100 percent. The kWh impacts supplied in the work papers for each of the program participants summed to 45,608 kWh, which is the amount that the evaluation team verified, but it was not 45,640 kWh as reported.

8.5 DETAILED FINDINGS—PILOTS

8.5.1 CoolSaver[®] A/C Tune-Up Pilot Market Transformation Program (Residential)

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
1.2%	164	164	100.0%	2.0%	383,549	383,549	100.0%	LOW



8. Impact Evaluation Results—Southwestern Electric Power Company...

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
3	2	1	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.

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 uncertainty ranking for these estimates is LOW.

8.5.2 ENERGY STAR® Appliance Rebate Pilot Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
0.4%	52	47	90.4%	0.5%	101,190	98,923	97.8%	LOW



8. Impact Evaluation Results—Southwestern Electric Power Company...

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
12	0	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.

Evaluated savings for the ENERGY STAR® Appliance Rebate Pilot Program were 47 kW and 98,923 kWh, with realization rates of 90 percent and 98 percent for demand and energy, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made through the desk reviews. Of the 12 projects reviewed, one project for window AC units had claimed savings based on an efficiency of 15 percent above standard, while the unit only had an efficiency of 10 percent above standard.

A. Documentation

Documentation was requested for 12 sites through the supplemental data request. Of these sites, documentation was provided for all 12, all of which had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

8.5.3 Small Business Direct Install Pilot Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
2.6%	368	391	106.0%	9.7%	1,816,431	1,662,034	91.5%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
5	0	0	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.

The realization rate for the Small Business Direct Install MTP was mainly driven by savings adjustments from onsite survey results. For site #186229, lighting fixture space types and operating hours were updated based on onsite findings resulting in overstated project savings. The change in savings resulted in decreased savings (site #186229 kWh realization rate equal to 67 percent and kW realization rate equal to 98 percent). For site #160564, outdoor lighting fixture operating hours were updated based on onsite findings of photocell operation and a fixture type was removed that was not found to be installed resulting in overstated project savings. The change in savings resulted in decreased savings (site #160564 kWh realization rate equal to 72 percent and kW realization rate equal to 97 percent). For site #160547, outdoor lighting fixture operating hours were updated based on onsite findings of photocell operation resulting in overstated project energy savings and no change to the demand savings. The change in savings resulted in decreased energy savings



8. Impact Evaluation Results—Southwestern Electric Power Company...

(site #160547 kWh realization rate equal to 72 percent and kW realization rate equal to 100 percent). For site #209650, lighting fixture types were updated based on onsite findings for a fixture with an unspecified replacement within the claimed calculations resulting in understated project savings. The change in savings resulted in increased savings (site #209650 kWh realization rate equal to 120 percent and kW realization rate equal to 159 percent).

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



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 PY2013 were slightly lower than demand (kW) and higher than energy (kWh) savings claimed, resulting in realization rates of 95 percent and 112 percent, respectively.

Realization rates were near or over 100 percent for all Commercial Market Transformation (CMTP) programs. Commercial Solutions MTP savings were adjusted based on only one on-site review, otherwise no other adjustments were made for this program. The realization rate for SCORE/City Smart was over 100 percent for both energy and demand savings, although the EM&V team made minor adjustments to savings for nearly all sites where on-site visits were completed.

Savings for the Residential Standard Offer Programs (RSOP) and Hard-to-Reach (HTR) SOPs were adjusted to account for findings from the tracking system, desk review, and on-site data collection activities. First, a review of the TRM 1.0 Volume 2 identified discrepancies in approved and tracked energy and demand savings. In particular, the duct sealing measures were not updated using the winter peak demand savings calculation. In several instances, the tracking system savings were not updated to reflect the TRM and contributed to adjustments for ceiling insulation, CFLs, and infiltration measures, although to a lesser impact than the duct sealing measures. Additionally, there were several infiltration reduction projects where the 10 percent minimum reduction was not achieved after accounting for the initial infiltration valued capped at four times the home square footage. No evaluated savings were reported for these projects.

The savings for the RSOP and HTR SOP programs were also adjusted based on desk reviews and from on-site M&V activities. Air infiltration reduction and duct efficiency improvement measures were most commonly adjusted based on these on-site visits.

The Low Income Weatherization Program had a realization rate of close to 100 percent. However, the EM&V team identified a number of discrepancies between the tracking system data and documentation via the desk review and on-site visits. These discrepancies adjusted the savings both upward and downward, resulting in an overall realization rate of 97 percent for demand and energy savings.

All other programs resulted in realization rates at or close to 100 percent.



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Table 9-1 shows the claimed and evaluated demand savings for TNMP's portfolio and broad customer sector/program categories for PY2013.

Table 9-1. TNMP Program Year 2013 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kw)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kw)	Precision at 90% Confidence
Total Portfolio		10,295	9,787	95.1%	3.9%
Commercial Sector	14.1%	1,451	1,444	99.6%	1.7%
Residential Sector	46.9%	4,827	4,325	89.6%	8.7%
Load Management	36.0%	3,702	3,702	100.0%	0.0%
Pilots	3.1%	315	315	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 9-2 shows the claimed and evaluated energy savings for TNMP's portfolio and broad customer sector/program categories for PY2013.

Table 9-2. TNMP Program Year 2013 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		16,980,658	19,079,798	112.4%	9.0%
Commercial Sector	32.6%	5,536,892	5,735,047	103.6%	0.6%
Residential Sector	58.5%	9,928,736	11,829,721	119.1%	14.6%
Load Management	0.0%	7,376	7,376	100.0%	0.0%
Pilots	8.9%	1,507,654	1,507,654	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**



9. Impact Evaluation Results—Texas New Mexico Power Company...

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 low, medium, and high associated with the uncertainty of the verification effort based on program documentation received from the utility. The most favorable rating for uncertainty of “low” was given when thorough and detailed documentation was received to verify the savings. The “high” uncertainty rating was given when the EM&V team received primarily project-level savings calculations without supporting documentation to verify the inputs in the calculations. It is important to note that this uncertainty rating is specific to program documentation received to verify claimed savings and is not an indicator of the reasonableness or accuracy of savings estimates.

Based on these uncertainty ranking, the sufficiency of program documentation provided to the EM&V team to complete a third-party due diligence review of evaluated demand savings is indicated as good, fair, or limited. For the utility program documentation score, the ranking of “good” was given if 90 percent or more of the evaluated savings estimates received a ranking of low or medium uncertainty due to program documentation received as indicated in detailed program findings. A ranking of “fair” was given if 70 percent–89 percent of the evaluated savings estimates received a ranking of low or medium. A ranking of “limited” was given if less than 70 percent of savings received an uncertainty ranking of low or medium. In general, a ranking of “good” indicates the utility has established processes to collect sufficient documentation to verify savings; a ranking of “fair” also indicates established processes with some areas of improvements identified; and a ranking of “limited” indicates program documentation improvements across more individual programs and/or high savings programs have been identified. The overall program documentation score for TNMP was good for kW and good 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 PY2013.

9.1.2 Cost-effectiveness results

TNMP’s overall portfolio had a cost-effectiveness of 3.09, or 3.37 excluding low-income programs.

The more cost-effective programs were Commercial Solutions MTP and ENERGY STAR New Homes MTP. The less cost-effective programs were Low Income Weatherization and Load Management SOP. All of TNMP’s programs passed cost-effectiveness.

The lifetime cost of PY2013 evaluated savings was \$0.016 per kWh and \$12.19 per kW.

Table 9-3. TNMP Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Total Portfolio	2.88	3.09
Total Portfolio excluding low-income programs	3.13	3.37
Commercial Sector	3.74	3.84



9. Impact Evaluation Results—Texas New Mexico Power Company...

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Commercial Solutions MTP	4.99	4.99
SCORE/CitySmart MTP	1.81	2.08
Residential Sector	3.18	3.55
ENERGY STAR New Homes MTP	5.38	5.38
Residential HVAC SOP	1.70	1.88
Large Residential SOP	3.26	3.55
Small Residential SOP	3.72	4.08
Large Hard-to-Reach SOP	2.00	2.59
Small Hard-to-Reach SOP	2.18	2.85
Low-Income	1.63	1.58
Low Income Weatherization	1.63	1.58
Load Management	1.10	1.10
Load Management SOP	1.10	1.10
Pilots	2.21	2.21
Small Business Pilot MTP	2.21	2.21

9.2 DETAILED FINDINGS—COMMERCIAL

9.2.1 Commercial Solutions Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
10.5%	1,083	1,029	95.0%	26.6%	4,525,025	4,568,465	101.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
12	4	4	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.

The realization rate for the Commercial Solutions MTP is near 100 percent for kW and just over 100 percent for kWh. The realization rate for the Commercial Solutions MTP was mainly driven by savings adjustments from one onsite survey results. For site #160923, the building type was corrected from onsite review findings resulting in understated project energy savings and overstated project demand savings. The change in savings resulted in increased energy



9. Impact Evaluation Results—Texas New Mexico Power Company...

and decreased demand savings (kWh realization rate = 108 percent and kW realization rate = 70 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for all of the 12 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 post inspection template for a project done across chain stores and to capture final reviewer notes to explain assumptions and changes made to project savings after post inspection findings were already incorporated. Since sufficient documentation was provided for 100 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

9.2.2 SCORE/CitySmart Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
3.6%	367	415	113.0%	6.0%	1,011,867	1,166,581	115.3%	MEDIUM

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
12	10	4	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.

The realization rate for SCORE/City Smart was over 100 percent for both energy and demand savings. Although a high realization rate, there were minor adjustments to savings for nearly all sites where on-site visits were completed. The specific sites and related adjustments are documented below.

Site #161526: Four updates were made to the project savings based on HVAC equipment findings found onsite including removal of a duplicate 2-ton unit, the addition of two 6-ton units, equipment type updates to unitary heat pumps for the units greater than 5-ton, and revising pre-retrofit units from cooling only to heat pumps that had indoor units with electric resistance heating to account for heating season energy savings. These updates resulted in understated project savings. The change in savings resulted in increased energy and demand savings (site #161526 kWh realization rate = 126 percent and kW realization rate = 112 percent).

Site #114683–10662: The new roof reflectance was updated based on observations during the onsite survey resulting in understated project savings. The change in savings resulted in increased energy and demand savings (site #114683–10662 kWh and kW realization rate = 113 percent).



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Site #160920: Four updates were made to the project savings based on HVAC equipment findings found onsite including the addition of one 3.5-ton unit, updating the efficiency rating and size of one unit, equipment type updates to unitary heat pumps for the units greater than 5-ton, and revising pre-retrofit units from cooling only to heat pumps that had indoor units with electric resistance heating to account for heating season energy savings. These updates resulted in understated project savings. The change in savings resulted in increased energy and demand savings (site #160920 kWh realization rate = 147 percent and kW realization rate = 126 percent).

Site #114683–10661: The new roof reflectance was updated based on observations during the onsite survey resulting in understated project savings. The change in savings resulted in increased energy and demand savings (site #114683–10661 kWh and kW realization rate = 132 percent).

Site #161522: One lighting fixture type and the overall building type was corrected from onsite findings resulting in overstated project savings. The change in savings resulted in decreased savings (site #161522 kWh realization rate = 94 percent and kW realization rate = 84 percent).

Site #213431: Corrections made from onsite findings included updates to building type, lighting fixture type and quantity changes resulting in understated project savings. The change in savings resulted in increased savings (site #213431 kWh realization rate = 154 percent and kW realization rate = 217 percent).

Site #114722: Additional retrofit lighting fixtures were identified during the onsite survey resulting in understated project savings. The change in savings resulted in increased savings (site #114722 kWh realization rate = 259 percent and kW realization rate = 262 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity and specifications) for 10 of the 12 sites that had desk reviews completed because insufficient documentation was provided for the sites. In particular, for one site TNMP provided the EM&V team with the requested material invoice; however, the quantity included numerous other sites for which quantities for the site in review could not be fully determined.

For the second site TNMP provided the EM&V team with a lighting fixture cut sheet which included the total fixture wattage for the lamp type used; however, the document did not specify the ballast type. A separate cut sheet for the ballast type used was not included. For this site, we were unable to verify the ballast type(s).

Also, in order to receive sufficient documentation for some of the other sites, the EM&V team went back to the implementation contractor and requested additional documentation beyond what was initially provided, specifically the post inspection template for a project done across chain stores. Since sufficient documentation was provided for 83 percent of the sampled sites, the uncertainty ranking for these estimates is MEDIUM.



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9.3 DETAILED FINDINGS—RESIDENTIAL

9.3.1 Residential Standard Offer Program

Program Component	Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
Large	15.9%	1,635	1,360	83.2%	21.5%	3,642,490	4,290,853	117.8%	LOW
Small	11.1%	1,143	951	83.2%	17.0%	2,888,287	3,402,402	117.8%	LOW
HVAC	0.4%	41	34	83.2%	0.7%	121,601	143,246	117.8%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
52	10	1	13

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

Evaluated savings for the Residential SOP were 1,360 kW and 4,290,853 kWh for Large projects, 951 kW and 3,402,402 kWh for Small projects, and 34 kW and 143,246 kWh for HVAC projects. Realization rates were assumed consistent for each program component, at 83 percent and 118 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

A. Data review

The data review realization rates are 139 percent for kWh and 99 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No 41722⁵²). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation. The impact of this difference is a realization rate of 166 percent for energy and 95 percent for demand. This is the largest driver of the program's data

⁵² Petition to approve revisions to residential deemed savings to incorporate winter peak demand impacts and update certain existing deemed savings values.



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review realization rate. Several additional instances occurred similarly for ceiling insulation, CFLs, and infiltration reduction measures, with minimal impacts by comparison.

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement) based on Project No. 41722. However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the table below.⁵³ These assumptions result in a conservative estimate of savings as they are generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (66 percent for kWh and 81 percent for kW), these measure comprise a small percentage (<2 percent) of the total program savings, so the overall impact on the program’s realization rate is minimal.

Table 9-4. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, ceiling insulation, and CFLs.

Additionally, there were four infiltration reduction projects where the 10 percent minimum reduction was not achieved after accounting for the initial infiltration valued capped at four times the home square footage. No evaluated savings were reported for these projects.

B. Data review

The EM&V team identified discrepancies in four measures through this process: the installation of central air conditioners, ceiling insulation, CFL installations, and duct efficiency

⁵³ These assumed values were provided by Frontier.



9. Impact Evaluation Results—Texas New Mexico Power Company...

improvements. In three projects, differences in SEER for central air conditioner installations were identified either through comparison with the AHRI database, or with the product cut sheet. In one project, ceiling insulation inputs did not match between the provided documentation and the tracking database; this was due to difference in the recorded R-value. For seven projects, the wattage ranges reported for CFL installations did not reflect project documentation. In one project, duct efficiency inputs did not match between the provided documentation and the tracking database; this was due to difference in the recorded heating system type.

C. Site visits

Site visits were conducted for 13 projects.⁵⁴ 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, natural 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.

Discrepancies beyond 20 percent were noted for three of the ten homes that received a site visit after duct improvements were performed, although one of these homes could not have duct leakage verified during the site visit. In cases where discrepancies were noted, the site visit measured leakage was 21 percent higher to 91 percent lower than reported.

Discrepancies beyond 10 percent were noted for two of the eight homes that received a site visit after air sealing was performed. In cases where discrepancies were noted, the site visit measured infiltration was between 24 percent to 54 percent higher than reported. For one site, the infiltration measured during the site visit was higher than the reported pre-retrofit leakage.

Discrepancies were also noted for the installation of ceiling insulation at two sites, in which the initial R-value or the square footage reported in the tracking database did not align with that found during the site visits.

D. Documentation

The EM&V team requested documentation for 77 sites through the supplemental data request. Of these sites, documentation was provided for 77, and all 77 had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

⁵⁴ Two of these sites had insufficient documentation to complete a desk review, for which a realization rate was imputed from the desk reviews for remaining projects.



9.3.2 Hard-to-Reach Standard Offer Program

Program Component	Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
Large	5.5%	567	551	97.3%	7.8%	1,319,777	1,856,530	140.7%	LOW
Small	1.7%	179	174	97.3%	2.8%	477,248	671,345	140.7%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
9	12	6	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.

Evaluated savings for the TNMP Hard-to-Reach SOP were 551 kW and 1,856,530 kWh for Large projects and 174 kW and 671,345 kWh for Small projects. Realization rates were consistent for each program component, at 97 percent and 141 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 tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

A. Data review

The data review realization rates are 139 percent for kWh and 97 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation. The impact of this difference is a realization rate of 162 percent for energy and 93 percent for demand. This is the largest driver of the program's data review realization rate. Several additional instances occurred similarly for ceiling insulation and infiltration reduction measures, with minimal impacts by comparison.

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement) based on Project No. 41722. However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the table



9. Impact Evaluation Results—Texas New Mexico Power Company...

below.⁵⁵ These assumptions result in a conservative estimate of savings as they are generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (93 percent for kWh and 215 percent for kW), these measure comprise a small percentage (<1 percent) of the total program savings, so the overall impact on the program’s realization rate is minimal.

Table 9-5. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, ceiling insulation, and CFLs.

Additionally, there were five infiltration reduction projects where the 10 percent minimum reduction was not achieved after accounting for the initial infiltration valued capped at four times the home square footage. No evaluated savings were reported for these projects.

B. Desk review

The EM&V team identified discrepancies in two measures through this process: duct efficiency improvements and CFL installations.

- In one project, duct efficiency inputs did not match between the provided documentation and the tracking database; this was due to difference in the recorded post-retrofit air leakage.
- For two projects, the wattage ranges reported for CFL installations did not reflect project documentation.

⁵⁵ These assumed values were provided by Frontier.



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C. Site visits

Site visits were conducted for eight projects.⁵⁶ 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, natural 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.

Discrepancies beyond 20 percent were noted for three of the eight homes that received a site visit after duct improvements were performed, while one of the remaining homes could not have duct leakage verified during the site visit. In cases where discrepancies were noted, the site-visit-measured leakage was 66 percent lower to 99 percent higher than reported.

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 site-visit-measured infiltration was between 10 percent lower and 39 percent higher than reported.

Discrepancies were also noted for one CFL installations, in which the number of installed lamps recorded during the site visit did not match the number reported in the tracking system.

D. Documentation

The EM&V team requested documentation for 22 sites through the supplemental data request. Of these sites, documentation was provided for 21, and 20 had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

9.3.3 ENERGY STAR® New Homes Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
9.6%	988	988	100.0%	6.0%	1,011,520	1,011,520	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
10	0	4	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.

⁵⁶ One of these sites had insufficient documentation to complete a desk review, for which a realization rate was imputed from the desk reviews for remaining projects.



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Evaluated savings for TNMP’s ENERGY STAR® New 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 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/Rate⁵⁷ 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.

Due to sufficient supporting documentation for all sampled homes, the uncertainty ranking for both the kW and kWh savings is LOW.

9.3.4 Low Income Weatherization Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
2.7%	275	267	97.2%	2.8%	467,814	453,826	97.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
7	3	0	7

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

Evaluated savings for the TNMP’s Low-Income Weatherization program were 267 kW and 453,826 kWh, with realization rates of 97% for demand and energy savings.

The realization rates were driven by adjustments to claimed energy and peak savings made at three levels: data review (to check tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

⁵⁷ 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>.



9. Impact Evaluation Results—Texas New Mexico Power Company...

A. Data review

The data review realization rates are 101 percent for kWh and 100 percent for kW. This is due in part to the EM&V team using the deemed savings reflected in TRM Version 1.0 Volume 2. In particular, savings for duct sealing measures were not consistent with the TRM Version 1.0. The impact of these differences are realization rates for duct sealing of 273 percent for energy and 141 percent for demand (approximately 2 percent and 0.5 percent of total program energy and demand savings, respectively).

In addition to savings adjustments to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for ceiling insulation, window AC, and water-savings measures.

Additionally, there were eight infiltration reduction projects where the 10 percent minimum reduction was not achieved after accounting for the initial infiltration valued capped at four times the home square footage. No evaluated savings were reported for these projects.

Finally, the remaining lifetime table used to calculate claimed savings for refrigerators differs from the values used by the EM&V Team and those presented within the TRM Version 1.0 Volume 2. The impact of this difference is a realization rate of 105 percent for energy and 104 percent for demand.

B. Desk review

The EM&V team identified discrepancies in three measures through this process: CFLs, air infiltration reductions, and solar screens.

- In four projects, the quantity or wattage ranges reported for CFL installations did not reflect project documentation.
- In one project, air infiltration inputs did not match between the provided documentation and the tracking database; this was due to difference in the recorded post-retrofit air leakage.
- For five projects, the heating system type for the installed screens did not match that recorded in the tracking system.

C. Site visits

Site visits were conducted for seven projects.⁵⁸ Discrepancies were noted for CFLs and solar screen measures.

- For one projects, the quantity of CFLs found during the site visit did not align with that recorded in the tracking database.

⁵⁸ Three of these sites had insufficient documentation to complete a desk review, for which a realization rate was imputed from the desk reviews for remaining projects.



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- At all seven sites, the square footage or heating system type of installed screens did not match that recorded in the tracking database.

D. Documentation

The EM&V team requested documentation for 13 sites through the supplemental data request. Of these sites, documentation was provided for 13, and 13 had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

9.4 DETAILED FINDINGS—LOAD MANAGEMENT

9.4.1 Load Management Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
36.0%	3,702	3,702	100.0%	0.0%	7,376	7,376	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
42	1	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 PY2013 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 42 reported program participants in 2013. The EM&V team received work papers and interval load data for all these participants. There were four events called during the summer of 2013.

Evaluated savings for the TNMP Load Management Program were 3,702 kW and 7,376 kWh. The realization rate for kW and kWh was 100 percent.



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9.5 DETAILED FINDINGS—PILOTS

9.5.1 Small Business Pilot (Open) Market Transformation Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
3.1%	315	315	100.0%	8.9%	1,507,654	1,507,654	100.0%	LOW

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
1	0	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.

Evaluated savings for the Open 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.

Please note that one desk review was completed for this program, however, the results were not accounted for within the program realization rate due to significantly small sample size. The results of this desk review are provided are for utility purposes only. For site #181572, the non-operating lighting fixtures found during the pre-inspection were >10 percent, therefore the percentage above 10 percent were removed from the pre-fixture savings resulting in understated project energy savings. The change in savings resulted in increased savings (kWh and kW realization rate = 115 percent).

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, specifications, non-operating fixtures) for the one site that had a desk review completed because sufficient documentation was provided for the site. 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 customer proposals, inspection summary files, and documentation regarding pre-lighting equipment non-operating fixtures. Since sufficient documentation was provided for 100 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.



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

Evaluated savings were slightly lower than Xcel SPS's reported savings for kW and slightly higher than Xcel SPS's reported savings for kWh. This resulted in realization rates under 100 percent for kW and over 100 percent for kWh.

Residential sector adjustments primarily drove the differences in both kW and kWh realization rates. Adjustments were made across all residential programs including RSOP, HTR and low income. A primary driver of adjustments across all programs was savings adjustments made to align with TRM Version 1.0. In addition, on-site M&V adjusted some project savings where, the EM&V team identified substantial differences in the values used to calculate savings for air infiltration reduction and duct efficiency improvement measures. In addition, on-site M&V also resulted in some changes across the three programs due to the EM&V team finding a different measure type, efficiency and/or quantity than recorded for claimed savings.

Commercial evaluated savings were slightly less than claimed savings due to onsite M&V findings used to adjust savings for all six of the sampled Large Commercial SOP projects. Adjustments were primarily made in HVAC calculations as the EM&V team used the 2013 calculation tool instead of the 2012 calculation tool used for claimed savings. In addition, for three of the six Large Commercial SOP projects changes were made based on different measure type and/or quantity found on-site from those used for claimed savings.

Table 10-1 shows the claimed and evaluated demand savings for Xcel SPS's portfolio and broad customer sector/program categories for PY2013.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

Table 10-1. Xcel SPS Program Year 2013 Claimed and Evaluated Demand Savings

Level of Analysis	Percent Portfolio Savings (kw)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kw)	Precision at 90% Confidence
Total Portfolio		5,105	4,594	90.0%	4.9%
Commercial Sector	18.5%	943	989	104.8%	8.3%
Residential Sector	36.7%	1,872	1,315	70.2%	16.0%
Load Management	44.9%	2,290	2,290	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 PY2013.

Table 10-2. Xcel SPS Program Year 2013 Claimed and Evaluated Energy Savings

Level of Analysis	Percent Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Precision at 90% Confidence
Total Portfolio		7,950,196	8,982,352	113.0%	15.1%
Commercial Sector	43.6%	3,462,732	3,712,556	107.2%	11.7%
Residential Sector	56.1%	4,462,229	5,244,561	117.5%	24.4%
Load Management	0.3%	25,235	25,235	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 qualitative rating of low, medium, and high associated with the uncertainty of the verification effort based on program documentation received from the utility. The most favorable rating for uncertainty of “low” was



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

given when thorough and detailed documentation was received to verify the savings. The “high” uncertainty rating was given when the EM&V team received primarily project-level savings calculations without supporting documentation to verify the inputs in the calculations. It is important to note that this uncertainty rating is specific to program documentation received to verify claimed savings and is not an indicator of the reasonableness or accuracy of savings estimates.

Based on these uncertainty rankings, the sufficiency of program documentation provided to the EM&V team to complete a third-party due diligence review of evaluated demand savings is indicated as good, fair, or limited. For the utility program documentation score, the ranking of “good” was given if 90 percent or more of the evaluated savings estimates received a ranking of low or medium uncertainty due to program documentation received as indicated in detailed program findings. A ranking of “fair” was given if 70 percent–89 percent of the evaluated savings estimates received a ranking of low or medium. A ranking of “limited” was given if less than 70 percent of savings received an uncertainty ranking of low or medium. In general, a ranking of “good” indicates the utility has established processes to collect sufficient documentation to verify savings; a ranking of “fair” also indicates established processes with some areas of improvements identified; and a ranking of “limited” indicates program documentation improvements across more individual programs and/or high savings programs have been identified. The overall program documentation score for Xcel SPS was fair for kW and limited for kWh. As program documentation recommendations from 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 PY2013.

10.1.2 Cost-effectiveness results

Xcel SPS’s overall portfolio had a cost-effectiveness of 4.65, or 5.28 excluding low-income programs.

The more cost-effective programs were Commercial SOP and Residential SOP. The less cost-effective programs were Low Income Weatherization and Load Management. All of Xcel SPS’s active programs passed cost-effectiveness. The Retro-commissioning MTP had start-up costs but no completed projects in 2013 since the program was rolled out mid-program year.

The lifetime cost of PY2013 evaluated savings was \$0.012 per kWh and \$9.35 per kW.

Table 10-3. Xcel SPS Cost-effectiveness Results

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Total Portfolio	4.38	4.65
Total Portfolio excluding low-income programs	4.95	5.28
Commercial Sector	6.11	6.52
Large Commercial SOP	8.20	8.86
Small Commercial SOP	7.50	7.53
Retro-Commissioning MTP	0.00	0.00



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

Level of Analysis	Claimed Savings Results	Evaluated Savings Results
Residential Sector	4.84	5.16
Residential SOP	5.67	6.43
Hard-to-Reach SOP	3.60	3.29
Low-Income	1.56	1.54
Low Income Weatherization	1.56	1.54
Load Management	1.17	1.17
Load Management SOP	1.17	1.17

10.2 DETAILED FINDINGS—COMMERCIAL

10.2.1 Commercial Standard Offer Program

The table below compares the savings claimed by the Xcel Large Commercial SOP, to the evaluated savings estimates. Evaluated energy savings for the Xcel Large Commercial SOP were higher than claimed energy savings, with a realization rate of 108.6 percent. Evaluated demand savings were also higher than the claimed demand savings taken from the program tracking system, with a realization rate of 105.7 percent.

A. Large Commercial Standard Offer⁵⁹

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2012 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
15.7%	802	847	105.7%	36.1%	2,870,487	3,117,349	108.6%	High

⁵⁹ The PY2013 CSOP results for Xcel-SPS include one project that was moved to PY2014. Due to the small savings of this project, its project-level realization rate close to 100 percent and the project's minimal impact on the realization rate (less than one-tenth), the evaluated project was not removed from the PY2013 results.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys***	On site M&V**
10	10	1	6

* 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.

*** Surveys completed for the combined Large and Small Commercial Standard Offer Programs.

The CSOP evaluation focused on desk reviews, customer surveys, market actor surveys, and on-site M&V. The sample of reviews and surveys performed for this program are listed above. Evaluated energy savings for the Xcel SPS Large Commercial SOP were greater than claimed energy savings, with a realization rate of 109 percent. Evaluated demand savings were also greater than the claimed demand savings, with a realization rate of 106 percent.

The evaluated energy and demand savings realization rates were driven by adjustments made during the desk review and on-site verification process. Out of the ten desk reviews and six on-site visits performed, five of them were found to have a realization rate other than 100 percent (ranging from 86 percent to 120 percent for energy, and 80 percent to 124 percent for demand); four of these sites were found to be major drivers of the evaluated savings, as they had their 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 #392482: This project used an *Other Measures* calculator to claim additional HVAC savings which were calculated based on the part-load efficiency. Since this is a standard deemed HVAC measure, only savings from a CalcSmart calculator were considered eligible, and the additional part-load savings claimed using the *Other Measures* calculator were considered ineligible. The evaluated desk reviewed energy and demand realization rates are 94 percent and 100 percent, respectively. No on-site verification was performed at this site.

Project ID #392486: The claimed savings in the tracking data for this project did not match the savings listed in the calculators provided. The evaluated desk reviewed and on-site verified energy and demand realization rates are 100 percent and 80 percent, respectively.

Project ID #616745: The on-site visit found a different number of fixtures than what was reported in the calculator. In addition, the claimed savings in the tracking data for this project did not match the savings listed in the calculators provided. The on-site verified energy and demand realization rates are 88 percent and 86 percent, respectively.

Project ID #662661: The on-site visit that occupancy sensors were installed in several of the areas, which were not claimed on the survey form. The on-site verified energy and demand realization rates are 120 percent and 124 percent, respectively.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

Table 10-4. Large CSOP Documentation Quality Assessment

Sufficient Documentation	Insufficient Documentation	No Documentation	Completed Desk Reviews
4	6	0	10

As shown in Table 10-4, the documentation provided for the Large Commercial SOP was sufficient for only 40 percent projects that were reviewed. Without adequate documentation, the EM&V team was not able to verify key inputs and assumptions that went into the savings calculations for these projects, including equipment quantities and equipment specifications (wattages, efficiencies, ballast factors, etc.). Therefore, documentation for the Xcel Large CSOP evaluation has been assigned an uncertainty rating of HIGH, as they have provided sufficient documentation for fewer than 70 percent of the projects in the sample.

i. Findings and Recommendations

- Two projects, ID #616751 and #392482, claimed additional HVAC savings calculated using the part-load efficiencies (IEER Savings – reported in the *Others Survey Form*). The deemed savings methodology uses the CalcSmart 2013 calculator and was approved by the PUCT in Docket 40885, which utilizes only the full-load efficiencies to calculate savings. If the part-load efficiencies are considered to be more representative of site specific operating conditions, the project savings must be calculated using the Custom M&V methodology instead of the deemed savings methodology. Additionally, all documentation in support of the savings calculations should be provided.

B. Small Commercial Standard Offer

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
2.8%	142	142	99.9%	7.4%	592,245	595,206	100.5%	High

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys***	On site M&V**
6	7	1	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.

*** Surveys completed for the combined Large and Small Commercial Standard Offer Programs.

The table above compares the savings claimed by the Xcel Small Commercial SOP to the evaluated savings estimates. Evaluated energy savings for the Xcel Small Commercial SOP were slightly higher than claimed energy savings, with a realization rate of 100.5 percent.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

Evaluated demand savings were slightly lower than the claimed demand savings taken from the program tracking system, with a realization rate of 99.9 percent.

The evaluated energy and demand savings realization rates were driven by adjustments made during the desk review and on-site verification process. Out of the six desk reviews and four on-site visits performed, only one project (Project ID 662645) was found to have evaluated savings that differed from the reported savings due to discrepancies in fixture counts based on the on-site findings. This project was the only driver of the realization rates, with a site-level energy realization rate of 103 percent and a site-level demand realization rate of 99 percent.

Table 10-5. Small CSOP Documentation Quality Assessment

Sufficient Documentation	Insufficient Documentation	No Documentation	Completed Desk Reviews
4	2	0	6

As shown in Table 10-5, the documentation provided for the Small Commercial SOP was sufficient for 66 percent of the desk reviews. Therefore, documentation for the Xcel Small CSOP evaluation has been assigned an uncertainty rating of HIGH, as they have provided sufficient documentation for fewer than 70 percent of the projects in the sample. However, it is important to note that the sample sizes for which documentation was requested was very small. The high uncertainty ranking is therefore more reflective of the sample sizes than the quality of the documentation received.

10.3 DETAILED FINDINGS—RESIDENTIAL

10.3.1 Residential Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)*	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
21.7%	1,109	823	74.2%	37.4%	2,974,459	3,697,550	124.3%	Low

* Claimed kW savings differ from the PY2013 EEPR

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
24	20	6	13

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

Evaluated savings for the Xcel SPS Residential SOP were 3,697,550 kWh and 823 kW, with realization rates of 124 percent and 74 percent, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three levels: data review (to check tracking system data are aligned with deemed savings



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

A. *Data review*

The data review realization rates are 156 percent for kWh and 86 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722⁶⁰). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation. The impact of this difference is a realization rate of 207 percent for energy and 63 percent for demand. This is the largest driver of the program's data review realization rate. There were also seven instances of infiltration reduction that the EM&V team adjusted to zero savings because the 10 percent minimum reduction was not met after the initial infiltration value was set at the cap of four times the home square footage. This had a minimal impact on the realization rate.

In addition to savings adjustments made to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the "adjusted" savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction and ceiling insulation.

B. *Desk review*

Desk reviews were completed for 24 projects. The EM&V team identified discrepancies in three measures through this process: in two projects, the heating system type used to calculate air infiltration savings differed between program tracking data and project documentation; in one project, the heating system type used to calculate savings for duct efficiency improvements differed between the program tracking data and project documentation; and in one project, differences in tonnage and SEER for one central air conditioner installation was identified through comparison with the AHRI database.

C. *Site visits*

Site visits were conducted for 13 projects.⁶¹ 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, natural variation is expected. For duct improvement measures, variation in measured

⁶⁰ Petition to approve revisions to residential deemed savings to incorporate winter peak demand impacts and update certain existing deemed savings values.

⁶¹ Six of these sites had insufficient documentation to complete a desk review, for which a realization rate was imputed from the desk reviews for remaining projects.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

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.

Discrepancies beyond ± 20 percent were noted for six of the nine homes that received a site visit after duct improvements were performed, while one of the remaining homes could not have duct leakage verified during the site visit. For two sites, the duct leakage measured during the site visit was slightly higher than, though nearly equal to, the reported pre-retrofit leakage, indicating that the service received was ineffective at the time of the on-site visit. No realized savings were assigned for these sites. In addition, for one site, the cooling tonnage measured during the site visit was lower than that recorded in the tracking database.

Discrepancies beyond ± 10 percent were noted for four of the five homes that received a site visit after air sealing was performed. For one site, the measured infiltration level was less than 10 percent the pre-value recorded in the tracking database and so no savings were claimed per the program requirements.

Discrepancies were also noted for two central air conditioner installations, in which the SEER values reported in the tracking database did not align with those attributed to the model numbers recorded on-site.

D. Documentation

Documentation was requested for a total of 27 sites through the supplemental data request. Of these sites, documentation was provided for 27, which had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

10.3.2 Hard-to-Reach Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
12.6%	642	376	58.6%	13.8%	1,100,241	1,164,055	105.8%	Low

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
6	11	4	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.

Evaluated savings for the Xcel SPS Hard-to-Reach SOP were 1,164,055 kWh and 376 kW, with realization rates of 106 percent and 59 percent, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three levels: data review (to check tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.



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A. Data review

The data review realization rates are 126 percent for kWh and 78 percent for kW. The EM&V team used the deemed savings reflected in TRM Version 1.0 Volume 2. Although this TRM version is officially not effective until 2014, it reflects the 2013 Deemed Savings Manual with updates approved in the winter peak demand savings petition (Project No. 41722). As this petition was approved in 2013, those updates are applied to savings claimed in 2013. In some cases, however, the savings were not updated in the tracking system to reflect the petition. In particular, the duct sealing measure savings were not updated using the winter peak demand savings calculation. The impact of this difference is a realization rate of 157 percent for energy and 55 percent for demand. This is the largest driver of the program's data review realization rate.

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement) based on Project No. 41722. However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the Table 10-6 below.⁶² These assumptions result in a conservative estimate of savings as they generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (82 percent for kWh and 221 percent for kW), these measures comprise a small percentage (<0.01 percent) of the total program savings, so the overall impact on the program's realization rate is minimal.

Table 10-6. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

In addition to savings adjustments made to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the "adjusted" savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not

⁶² These assumed values were provided by Frontier.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, ceiling insulation, and CFLs.

B. Desk review

Desk reviews were completed for six projects. No discrepancies were identified by the EM&V team through this review.

C. Site visits

Site visits were conducted for three projects.⁶³ 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, natural 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.

Discrepancies beyond ± 20 percent were noted for the one home that received a site visit after duct improvements were performed. The site-visit-measured leakage was significantly higher than reported (by 108 percent), potentially indicating a faulty installation in that case.

Discrepancies beyond ± 10 percent were noted for the one home that received a site visit after air sealing was performed. The site-visit-measured infiltration was 56 percent higher than reported.

D. Documentation

Documentation was requested for a total of 11 sites through the supplemental data request. Of these sites, documentation was provided for 11, and 11 had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

10.3.3 Low-Income Weatherization

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
2.4%	120	115	96.0%	4.9%	387,529	382,956	98.8%	Low

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
10	11	0	5

* Confidence intervals are not reported at the utility program level as these results should

⁶³ All of these sites had sufficient documentation to complete a desk review.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

only be viewed qualitatively due to the very small sample sizes.

Evaluated savings for the Xcel SPS Low-Income Weatherization program were 382,956 kWh and 115 kW, with realization rates of 99 percent and 96 percent, respectively.

The realization rates were driven by adjustments to claimed energy and peak savings made at three levels: data review (to check tracking system data are aligned with deemed savings manual), desk review (to check measure data collected by contractors on forms is reflected correctly in the tracking system), and site visit review (to check measure data exist in the home is as recorded on the forms). Details on the adjustments at each level are provided below.

A. Data review

The data review realization rates are 101 percent for kWh and 101 percent for kW. This is due in part to the EM&V team using the deemed savings reflected in TRM Version 1.0 Volume 2. In particular, savings for duct sealing measures were not consistent with the TRM version 1.0. The impact of these differences are realization rates for duct sealing of 223 percent for energy and 129 percent for demand (≤ 1 percent of total program savings).

TRM Version 1.0 Volume 2 also includes updated savings for water heater measures (aerators, showerheads, pipe insulation and tank insulation, water heater replacement). However, the data collected in the utility tracking systems in 2013 does not capture all of the parameters necessary to apply the updated savings algorithms. As a result, the EM&V team estimated the savings using the assumptions as illustrated in the Table 10-7 below.⁶⁴ These assumptions result in a conservative estimate of savings as they are generally reflect the minimum requirements for measure qualification. Although for these water heater measures, the realization rate adjustment is significant (102 percent for kWh and 105 percent for kW), these measure comprise a small percentage (<2 percent) of the total program savings, so the overall impact on the program's realization rate is minimal.

Table 10-7. Assumed Values of Specific Measures

Measure	Parameter	Assumed Value
Faucet Aerator	Flow Rate	1.5 GPM
Low-flow Showerheads	Flow Rate	2.0 GPM
Pipe Insulation	Pipe Diameter	0.5 inches
Pipe Insulation	Pipe Length	5 feet
Pipe Insulation	R-value	3
Tank Insulation	Recovery Efficiency	0.98
Tank Insulation	Tank Size	40 Gal
Tank Insulation	R-value	6.7
Water Heater Replacement	Tank Size	30 Gal
Water Heater Replacement	Number of Bedrooms	1

⁶⁴ These assumed values were provided by Frontier.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

In addition, the remaining lifetime table used to calculate claimed savings for refrigerators differs from the values used by the EM&V team and those presented within the TRM Version 1.0 Volume 2. The impact of this difference is a realization rate of 106 percent for energy and 106 percent for demand.

Finally, for window AC measures, claimed savings used a different methodology from the TRM Version 1.0 Volume 2 that accounted for weather zone when determining operating hours of the unit (a single value is uniformly assumed in the TRM). Additionally, claimed savings appear to use a different baseline for replaced units over 12 years of age, which again differs from the savings calculations in the TRM. The impact of this difference is a realization rate of 119 percent for energy and 108 percent for demand.

In addition to savings adjustments made to align with TRM Version 1.0, another driver for the data review realization rate is related to the utility QA/QC adjustments. Since both the QA/QC adjustments and the updates to the winter peak demand savings petition were made to the “adjusted” savings in the tracking system, the EM&V team was not able to separate out the impacts of these two effects. As such, QA/QC adjustments made by the utility are not included in the final evaluated savings estimates. This resulted in a small impact on the realization rate for infiltration reduction, central AC, heat pump, window AC, refrigerator, and CFLs.

B. Desk review

Desk reviews were completed for 10 projects. The EM&V team identified discrepancies in one measure, CFLs, through this process. In five instances across three projects, the quantity or wattage ranges reported for CFL installations did not reflect project documentation. For several of these projects, discrepancies existed within the provided documentation; where this was the case, the Customer Certification Form was treated as the most reliable source, unless an inspection form was available.

C. Site visits

Site visits were conducted for five projects, all of which received desk reviews where sufficient documentation was provided. All of these sites had sufficient documentation to complete a desk review. 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, natural variation is expected. For infiltration measures, variation within ± 10 percent is expected for blower door test results.

Discrepancies beyond ± 10 percent were noted for one of the two homes that received a site visit after air sealing was performed. In the case where a discrepancy was noted, the site-visit-measured infiltration was 54 percent higher than reported. The post-infiltration measurement was less than 10 percent of the pre-infiltration measurement and thus no savings are claimed for this project.⁶⁵ For the other site, the heating system type measured during the site visit did not align with that recorded in the tracking database.

⁶⁵ During the finalization of the report, the EM&V team discovered that data from measures with zero savings through the site visits were not included in the realization rate calculation. Due to the timing of the report, this correction was not included in this report.



10. Impact Evaluation Results—Xcel Energy Southwestern Public Service Company...

Discrepancies were also noted for ceiling insulation, CFL, low-flow showerhead, and solar screen measures. For one project, the home heating system type and the starting insulation R-value differed between those reported in the tracking system and those recorded on-site. For one project, the quantity of CFLs found during the site visits did not align with that recorded in the tracking database. At one home, the tracking database reported that two low-flow showerheads had been installed, but none were verified by field staff. At one site, the square footage of installed screens did not match that recorded in the tracking database.

D. Documentation

Documentation was requested for a total of 10 sites through the supplemental data request. Of these sites, documentation was provided for 10, and 10 had sufficient documentation for review. Since sufficient documentation was provided for more than 90 percent of the sampled sites, the uncertainty ranking for these estimates is LOW.

10.4 DETAILED FINDINGS—LOAD MANAGEMENT

10.4.1 Load Management Standard Offer Program

Program Contribution To Portfolio Savings (kW)	2013 Claimed Demand Savings (kW)	2013 Evaluated Demand Savings (kW)	Realization Rate (kW)	Program Contribution To Portfolio Savings (kWh)	2013 Claimed Energy Savings (kWh)	2013 Evaluated Energy Savings (kWh)	Realization Rate (kWh)	Uncertainty Ranking
44.9%	2,290	2,290	100.0%	0.3%	25,235	25,235	100.0%	Low

Completed Desk Reviews*	Completed Customer Surveys	Completed Market Actor Surveys	On site M&V
5	1	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 PY2013 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 five reported program participants in 2013 and this is the number of participants for which the evaluation team received work papers and interval load data. There were three events called during the summer of 2013.

Evaluated savings for the Xcel Load Management Standard Offer Program were 2,290 kW and 25,235 kWh. The realization rate for kW was 1.000 and the realization rate for kWh was also 1.000.