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April 29, 2016

Michael Sappington, Secretary
Arkansas Public Service Commission
P.O. Box 400
Little Rock, Arkansas 72203-0400

RE: Docket No. 07-082-TF

Dear Mr. Sappington:

Enclosed for filing with the Arkansas Public Service Commission (APSC) is the SWEPCO Annual Report as well as Appendix A, B, and C and the SWEPCO Annual Workbook Excel File.

If you have any questions, please feel free to give me a call.

Sincerely,

/s/ DAVID R. MATTHEWS

David R. Matthews

Enclosure

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AEP SOUTHWESTERN ELECTRIC POWER COMPANY℠

A unit of American Electric Power

Southwestern Electric Power Company

Arkansas Energy Efficiency Program Portfolio Annual Report

Docket No. 07-082-TF

April 29, 2016

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1.0 Executive Summary

1.1 Historical Background of the EE Portfolio

On May 25, 2007, in Docket No. 06-004-R, the Arkansas Public Service Commission (APSC or the Commission) approved the "Rules for Conservation and Energy Efficiency Programs" (C&EE Rules). These rules require that each operating utility within the jurisdiction of the Commission file an Annual Report by April 1 of each year. The report should address "the performance of each conservation and energy efficiency program operated by the utility."[1] On September 9, 2013, in Order No. 7 of Docket No. 13-002-U, the Commission approved a revised schedule to transition to a May 1 annual filing date beginning in 2016.

Quick Start Period (Oct 1, 2007 – Dec 31, 2008)

During the Quick Start Period (Oct 1, 2007 – Dec 31, 2008), Southwestern Electric Power Company (SWEPCO or the Company) operated three energy efficiency programs and one demand response program. In addition, the Company co-sponsored two statewide programs. During the Quick Start period, SWEPCO achieved 5,640.1 MWh in energy savings and 2,926 kW in demand savings. Approximately 4,300 customers participated in Energy Efficiency (EE) programs with the vast majority participating in the Compact Fluorescent Lighting Program.

Program Year 2009

On April 1, 2009, SWEPCO filed its first Comprehensive Energy Efficiency Plan (CEEP). The Company received approval to implement this CEEP which included the addition of two new Market Transformation programs, on February 3, 2010.

During the Program Year (PY) 2009, SWEPCO achieved 6,075.5 MWh in energy savings and 5,611 kW in demand savings.

Program Year 2010 Results

During PY 2010, SWEPCO achieved 10,737,150 kWh in energy savings and 8,603 kW in demand savings, which surpassed its approved energy and demand savings goals by over 40% and 23%, respectively. Compared to PY 2009, the Company increased its energy and demand savings by 77% and 53%, respectively. These savings were

[1] APSC Rules for Conservation and Energy Efficiency, Section 9, p. 11

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unevaluated gross savings and equated to approximately 0.26% of the Company's 2010 booked energy sales.

Table 1 summarizes the gross unevaluated energy and demand savings achieved by SWEPCO during the Quick Start Period, PY 2009, and PY 2010:

Table 1 - Gross Unevaluated Energy and Demand Savings for Quick Start, PY 2009, and PY 2010

Program Period	Energy Saved	Demand Saved
Quick Start Period	5,640.1 MWh	2,026 kW
PY 2009	6,075.5 MWh	5,611 kW
PY 2010	10,737.1 MWh	8,603 kW

Approved Goals and Self-Direct Impact for Program Years 2011-2014

On March 15, 2011, SWEPCO filed its revised CEEP for the second half of PY 2011 and for PY 2012 through PY 2013 pursuant to the portfolio energy savings goals established by the Commission under Order #15 in Docket No. 08-137-U. Under this order, the Commission adopted default goals for electric investor owned utilities of 0.25%, 0.50%, and 0.75% for PY 2011, PY 2012, and PY 2013, respectively. These goals were to be based on a percentage of SWEPCO's 2010 booked energy sales less the 2010 book sales to commercial and industrial customers (C&I) who were approved to Self-Direct (SD). In developing its revised CEEP, the Company estimated that approximately 20% and 40% of its 2010 energy sales to C&I customer would be approved to SD in PY 2012 and PY 2013, respectively. SWEPCO made substantial changes to its approved CEEP beginning July 1, 2011 which were carried forward into PY 2012 and beyond. The Commission approved the Company's revised CEEP with Order No. 36 on June 30, 2011 in Docket No. 07-082-TF.

Approximately 35% of SWEPCO's Commercial and Industrial 2010 energy sales were approved to SD in PY 2012 resulting in a 3,142,832,720 kWh 2010 retail sales basis for goal determination. This increased to approximately 37% in PY 2013 resulting in a 3,079,034,170 kWh 2010 retail sales basis for the purposes of goal determination.

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On January 30, 2013, the Commission issued the second Order No. 57 in Docket No. 07-082-TF which directed "that energy savings targets, budgets, and the incentive structure previously approved by the Commission in the TF dockets for use by the Utilities and EE program administrators for the existing Program Year 2013 shall also be used for Program Year 2014 . . ."[2] In addition, Commercial and Industrial 2010 energy sales approved to SD in PY 2014 increased dramatically with the passage of Act 253 resulting a 2,834,133,580 kWh 2010 sales bases for PY 2014 goal determination.

Table 2 summarizes the energy savings goal and achievement for PY 2011 - PY 2014, and the energy savings goals associated with SWEPCO's approved CEEP incorporating the retail sales adjustments for those customers approved to SD in PY 2012 – PY 2014. Table 2 also summarizes the Company's energy savings achievements and its net evaluated energy savings achievements as a percentage of its approved goals for PY 2011 – PY 2014.

Table 2 - Net Evaluated Energy Savings PY 2011 – PY 2014

Program Year	Energy Savings Goal %	Net Energy Savings Goal	Net Energy Saved	Percent of Goal Achieved
2011	0.25	10,426 MWh	11,855 MWh	105%
2012	0.50	15,714 MWh	15,714 MWh	113%
2013	0.75	23,093 MWh	25,388 MWh	110%
2014	0.75	21,339 MWh	30,055 MWh	141%

SWEPCO was the only electric utility to exceed 100% of its net evaluated energy savings goal in PY 2011. The Company's net evaluated energy savings attributed to its PY 2011-PY 2014 EE Programs were determined by its independent Evaluation, Measurement, and Verification (EM&V) contractors. The Cadmus Group (Cadmus) was the primary evaluator for the all of the Company's PY 2011-PY 2014 programs with the exception of the statewide Arkansas Weatherization Program (AWP) which was evaluated by ADM Associates, Inc. during this period.

For more details on SWEPCO's accomplishments in PY 2012-PY 2014, please refer to the Company's Energy Efficiency Program Portfolio Annual Reports filed in Docket No. 07-082-TF on April 23, 2013, March 31, 2014, and April 1, 2015, respectively. The EM&V Reports prepared by Cadmus for PY 2012-PY 2014 are included as Appendix A

[2] Docket No. 07-082-TF, Order No. 57, p. 11

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in the above referenced reports. The EM&V Reports prepared by ADM Associates, Inc. for the AWP for PY 2012-PY 2014 are included as Appendix B in the above referenced reports. The Company's portfolio was cost-effective during PY 2012 - PY 2014 with Total Resource Cost Test (TRC) benefit cost ratios of 1.62, 1.65, and 2.33, respectively.

1.2 Program Year 2015 Results

1.2.1 Major Accomplishments

SWEPCO achieved greater than 100% of its approved net energy savings goal for the fifth consecutive year. In PY 2015, the Company substantially exceeded its energy savings goal by achieving 31,418 MWh in net evaluated energy savings which were 129%[3] of the Company's net energy savings goal based on 0.90% of SWEPCO's PY 2013 retail sales, or 24,273 MWh.[4] This goal reflects an adjustment to energy savings based on the 2013 sales of C&I customers approved to SD through the end of PY 2014. The 2013 sales to approved SD C&I customers increased slightly and are approximately 46% of the Company's total 2013 C&I energy sales. The Company achieved 15,857 MW in evaluated demand savings which was approximately 106% of its planned demand reduction goal of 14.963 MW.[5] SWEPCO earned a $721,926 Performance Incentive for energy savings achievements. This was the maximum Performance Incentive available which is equivalent to 7% of its approved PY 2015 budget of $10,313,940.[6] The portfolio was again cost-effective with a TRC benefit cost ratio of 2.49 and net TRC benefits of $16,295,173.[7] The Company's portfolio acquisition cost (i.e., cost per kWh) was $0.27 per kWh in PY 2015 and "has been relatively stable since 2012." [8]

[3] Appendix A, Cadmus Evaluation Report, Table 6, p. 8 (but excludes minor energy savings attributed to the AWP)
[4] To be supported by the Direct Testimony of Phillip A. Watkins on June 1, 2016 in Docket No. 07-082-TF
[5] Appendix A, Cadmus Evaluation Report, Table 6, p. 8 (but excludes minor demand savings attributed to the AWP)
[6] Order No. 15 in Docket No. 13-002 extended the PY 2014 approved budget for use in PY 2015
[7] Appendix A, Cadmus Evaluation Report, Table 12, p. 22. To be supported by the Direct Testimony of Byron Boyle on June 1, 2016 in Docket No. 07-082-TF
[8] Appendix A, Cadmus Evaluation Report, p. 16

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2015 Portfolio Summary						
Net Energy Savings		Cost			Cost-Benefits	
Demand MW	Energy MWh	Actual Expenses	LCFC	Performance Incentives	TRC Net Benefits	TRC Ratio
16	31,462	$ 8,664,518	$ 2,841,207	$721,976	$ 16,295,148	2.49

Figure 1 – EE Portfolio Summary

The Company's net evaluated annualized kWh savings attributed to its PY 2015 EE Programs were again determined by its independent EM&V contractors. Cadmus was again the evaluator for all of the Company's PY 2015 programs with the exception of the AWP and EEA. The AWP was again evaluated by ADM Associates, Inc. A process or impact evaluation for Energy Education Arkansas (EEA), managed by the Arkansas Energy Office (AEO) was not required in PY 2015.

1.2.2 Goals and Objectives of EE Portfolio

SWEPCO's primary goals and objectives are to exceed its prescribed energy savings goal by providing cost-effective and comprehensive energy efficiency programs which facilitate energy and peak demand reductions in all customer classes and market segments. In PY 2015, the Company's primary objectives were again to 1) increase the participation and comprehensiveness of its residential programs, in particular its Residential Standard Offer (RSOP) and Home Performance with ENERGY STAR Programs (HPwES) and 2) increase the diversity of the measures offered through its C&I program, in particular its Small Business Direct Install (SBDI) and Targeted Standard Offer Program (TSOP) which was marketed as the Company's C&I Energy Efficiency Program (CIEEP).

The Company set-out the following goals to achieve these objectives in PY 2015:

<u>Residential Programs</u>

- Conduct trade ally meetings to provide updated PY 2015 documents and maintain active trade allies in the SWEPCO Residential Contractor Network
- Broaden program reach by enrolling new trade allies to target rural SWEPCO customers
- Expand the program measure mix in the multifamily market

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- Conduct trade ally trainings to emphasize best practices including building science and successful business model strategies
- Enhance the integrated marketing campaign
- Update SWEPCOgridSMART.com content to include more ENERGY STAR informational pieces and photos to educate customers on energy efficiency
- Educate multifamily participants about potential participation in SWEPCO's commercial programs
- Continue cross promotion with the SourceGas (now known as Black Hills Energy) Home Energy Savings program with customers and contractors
- Assisted trade allies by recruiting a base of customer projects through property management groups and housing authorities to provide the trade ally with initial program participation opportunities
- Simplify program data requirements within HPwES to reduce paperwork required by the trade allies
- Continue the use of a customer follow-up mailer for customers that received a home energy assessment but did not install any major measures
- Provide software, training, and equipment scholarships for eligible trade allies

Commercial & Industrial Programs

- Continue promotion of new measures in the CIEEP including point-of-sale air compressors and commercial HVAC tune-ups
- Continue to utilize Direct Install (DI) measures to increase measure diversity and comprehensiveness in the CIEEP
- Increase education and communication efforts with trade allies
- Train and enroll more contractors in the Small Business Direct Install Program (SBDI)
- Increase overall communication with SBDI contractors
- Achieve seamless cross promotion and implementation of both the CIEEP and the SBDI
- Continue to offer trade allies the option of installing water measures and vending economizers at no cost

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- Increase inter-fuel, inter-utility coordination with SourceGas (now known as Black Hills Energy), the primary natural gas provider that overlaps the SWEPCO service territory

The Company also sought to achieve additional portfolio comprehensiveness as described in the APSC's *Comprehensiveness Checklist*.[9]

1.2.3 Progress Achieved versus Goals and Objectives

SWEPCO met the portfolio goals and objectives stated above and these achievements are more thoroughly described in Portfolio Program discussion in Section 2.0 below. Each customer class and market segment had access to energy assessments and programs offering single or multiple measure incentives. The Company's "plan includes a cost-effective portfolio of energy efficiency, conservation, and peak load reduction programs designed to facilitate reductions in electricity and peak demand in every customer class."[10] The trade ally networks for both residential and non-residential programs were expanded and active in the training provided by Implementation Staff. Examples include:

- Hosted two Community Ally luncheon meetings to provide program awareness to customers and local community leaders
- Hosted trade ally appreciation luncheon meetings for network trade allies in Northwest (NW) and Southwest (SW) Arkansas
- Conducted kick-off calls with manufacturers which included updated field practices and in-store marketing (RLP)
- Conducted Contractor Kick-off Meeting (HPwES and RSOP)
- Hosted two contractor trainings – Sales and the Customer Experience and Insulation Best Practices (HPwES and RSOP)
- Participated in 99 outreach events, interacting with approximately 4,400 people (HPwES, RSOP, RESAP, and RLP)
- Provided LED and advanced lighting training seminars in Texarkana and NW Arkansas (CIEEP and SBDI)
- Provided CoolSaver contractor training (CIEEP and SBDI)

[9] As defined in Docket No. 08-144-U, Order No. 17
[10] Appendix A, Cadmus Evaluation Report, p. 1

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The integrated marketing campaign was enhanced through the use of:

- Quarterly trade ally newsletters to communicate program news and activities
- Commercial billboards in NW and SW Arkansas
- Two direct emails and one bill insert to all commercial customers (CIEEP and SBDI)
- A newly developed Online Lighting Marketplace
- Newly developed customer brochures which list top performing contractors and streamline program details
- Seasonal advertising focusing on home comfort and lower energy costs in order to increase program awareness and participation
- Thank You cards mailed to participating RSOP and Residential ENERGY STAR Appliance Program (RESAP) customers to provide program cross-promotion
- Quarterly trade ally trainings which emphasized the field mentoring of contractors and development of best practices

1.2.4 High Level Recap of Portfolio Savings, Participation Levels, Prior Year Comparisons

The chart below illustrates the upward trend of budgets, expenditures, and savings since the first full year implementation of SWEPCO's revised Comprehensive Energy Efficiency Portfolio (CEEP).

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Company Statistics

Program Year	Revenue and Expenses					Energy				
		Budget		Actual			Plan		Evaluated	
	Total Revenue (a) ($000's)	Portfolio Budget (b) ($000's)	% of Revenue (%=b/a)	Portfolio Spending (c) ($000's)	% of Revenue (%=b/a)	Total Annual Energy Sales (d) (MWh)	Net Annual Savings (e) (MWh)	% of Energy Sales (%=b/a)	Net Annual Savings (f) (MWh)	% of Energy Sales (%=b/a)
2011	$ 276,382	$ 3,773	1.4%	$ 3,467	1.3%	4,175,229	11,855	0.3%	10,955	0.3%
2012	$ 268,428	$ 6,788	2.5%	$ 5,289	2.0%	4,062,114	20,719	0.5%	17,767	0.4%
2013	$ 285,450	$ 10,314	3.6%	$ 6,803	2.4%	4,032,158	28,646	0.7%	25,387	0.6%
2014	$ 300,309	$ 10,314	3.4%	$ 7,632	2.5%	4,037,072	28,015	0.7%	30,056	0.7%
2015	$ 293,082	$ 10,314	3.5%	$ 8,665	3.0%	3,956,721	26,475	0.7%	31,462	0.8%

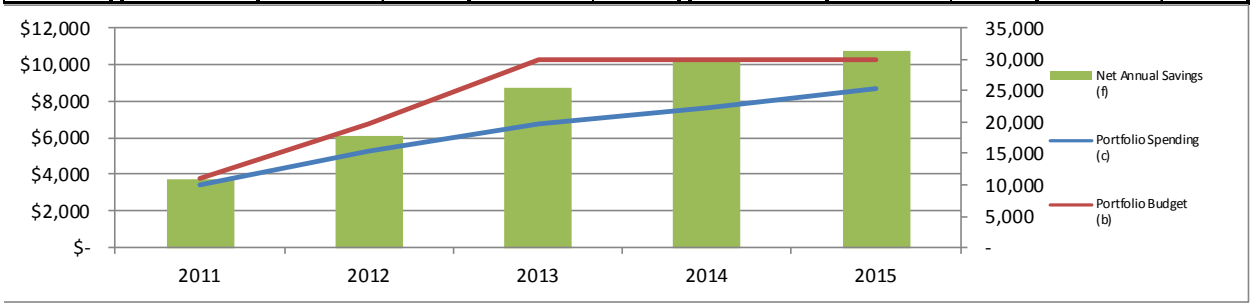

Figure 2 – SWEPCO Statistics
(Note: Total Revenue and Total Annual Energy Sales include revenue and energy sales from Self-Direct customers.)

As illustrated in the following figures, SWEPCO spent 84% of its approved budget, with the majority of dollars being expended for customer and contractor Incentives and for Marketing and Delivery.

EE Portfolio Cost by Program

Program Name	Target Sector	Program Type	2015 Budget ($)	2015 Actual ($)	% of Budget
Arkansas Weatherization Program (AWP)	Residential	Whole Home	394,110	5,886	1%
Discontinued-Residential Appliance	Residential	Consumer Product Rebate	-	-	-
Discontinued-Residential Solutions	Residential	Prescriptive/Standard Offer	-	-	-
Home Performance w/ ENERGY STAR (HPw	Residential	Whole Home	1,170,294	1,112,410	95%
Online Audit Tool	Residential	Behavior/Education	12,400	11,224	91%
Residential ENERGY STAR Appliance Progra	Residential	Consumer Product Rebate	625,013	283,846	45%
Residential Lighting Program (RLP)	Residential	Consumer Product Rebate	580,141	610,585	105%
Residential Standard Offer Program (RSOP)	Residential	Prescriptive/Standard Offer	1,744,518	1,291,004	74%
Small Business Direct Install (SBDI)	Small Business	Prescriptive/Standard Offer	1,081,432	1,123,735	104%
Discontinued-Commercial Solutions	Commercial & Industrial	Other	-	-	-
Load Mngmnt Stndrd Offer Program (LMSOP	Commercial & Industrial	Demand Response	341,640	283,642	83%
Targeted Commercial & Industrial SOP (TSO	Commercial & Industrial	Other	4,264,937	3,769,378	88%
Energy Efficiency Arkansas (EEA)	All Classes	Behavior/Education	34,147	36,154	106%
Regulatory	-	-	65,308	136,654	209%
		Total	**10,313,940**	**8,664,518**	**84%**

Figure 3– EE Portfolio Cost by Program

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EE Portfolio Summary by Cost Type				
EE Program Cost Summary	2015 Total Cost			
Cost Type	% of Total	Budget ($)	Actual ($)	% of Total
Planning / Design	1%	115,000	56,587	1%
Marketing & Delivery	23%	2,387,309	2,770,648	32%
Incentives / Direct Install Costs	69%	7,140,355	5,075,127	59%
EM&V	3%	306,075	327,224	4%
Administration	3%	299,893	298,279	3%
Regulatory	1%	65,308	136,654	2%
	100%	**10,313,940**	**8,664,518**	100%

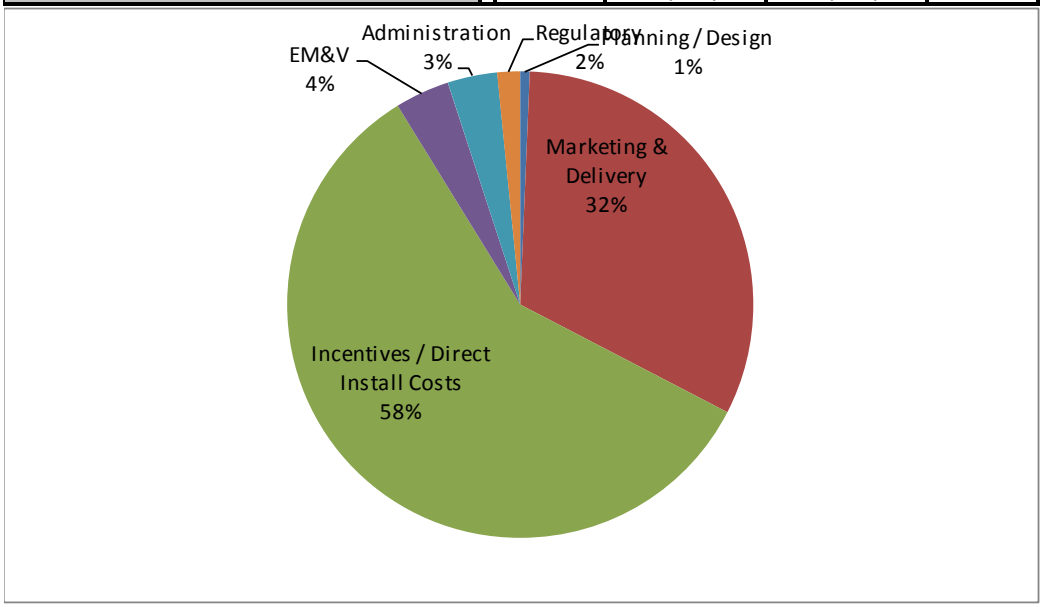

Figure 4 – EE Portfolio Summary by Cost Type

1.2.5 Highlights of Well-Performing Programs

The Company again improved its participation and net energy savings achievements in the residential sector in PY 2015. HPwES "performed the best of all programs when compared to goals, exceeding SWEPCO's net savings goal by 60%."[11] For the second straight year, the U.S. Environmental Protection Agency (EPA) recognized SWEPCO as an ENERGY STAR Partner of the Year based on the performance of HPwES. The RSOP also exceeded its energy savings goal by 40% with a substantial percentage of the energy savings being attributed to reducing air infiltration and duct improvement.

While the Company's Residential Lighting Program (RLP) fell short of its energy savings goal by 2%, this was consistent with participation, which fell 8% below target in PY

[11] Appendix A, Cadmus Evaluation Report, p. 8

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2015. Nonetheless, participation in the RLP increased by approximately 4% over PY 2014.

In addition, the Commercial & Industrial Energy Efficiency Program (CIEEP) exceeded its energy savings goal for the first time, achieving 123% of its energy savings goal, which is up 48% from PY 2014. A substantial percentage of the net evaluated energy savings (10,105,903 kWh) in the CIEEP were attributed to LED retrofits which also improved the overall cost-effectiveness of this program.

1.2.6 What's Working and What's Not

Enhanced marketing outreach activities improved customer and trade ally satisfaction. Some examples are as follows:

- An outreach calendar including media channels, tactics, and messages
- A mass media campaign at the portfolio level to increase customer awareness
- Direct customer outreach with follow-up
- Case studies

Direct Install measures as well as of point-of-sale air compressors and various types of custom measures continued to help maintain measure diversity and comprehensiveness in this program in PY 2015; however, there was less diversity in the overall measure mix in PY 2015 primarily due to the large number of LED lighting projects. "Retrofit lighting represented 76% of the reported 2015 CIEEP savings, of which most (86%) was from a combination of linear and screw-based LED lighting."[12]

While the Implementation Staff has successfully recruited a large number of participating contractors into the SBDI Program, the majority of these new trade allies continue to focus on lighting measures. Therefore, the Company has not reached the level of measure diversity in this program as desired. While the Implementation Staff has focused on recruiting contractors who can create greater measure diversity in this program, more improvement is needed. The lack of measure diversification in the SBDI program may also be attributed to the fact that the program is limited to customers with peak demands of no more than 50 kW.

[12] Appendix A, Cadmus Evaluation Report, p. 37

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Additional highlights regarding of "What's Working" are also described in Section 1.2.5 above.

The LMSOP, the Company's only demand response program, led all programs in demand savings, but its energy savings' performance was again constrained due to atypically cool weather conditions during the curtailment season. SWEPCO continues to review the threshold at which it makes calls for demand reductions from participating customers. In addition, the program is not intended or designed to be a significant contributor to the portfolio energy savings.

In the RLP, the evaluation contractor found that freeridership associated with LED products sold through this program was higher than expected; the evaluation contractor attributed this to a relatively low incentive rate, less aggressive promotional activity, and with consumer characteristics that tend to favor lower priced products. Despite high levels of freeridership, the RLP remains cost-effective.

The Residential ENERGY STAR Appliance Program (RESAP) "has struggled to make a significant contribution to SWEPCO's portfolio since inception. The challenges associated with this program have been well documented in prior evaluation reports. In 2016, SWEPCO plans to discontinue the program and offer select appliance rebates as part of a re-designed Residential Lighting and Appliances Program."[13] Participation estimates were substantially over-estimated in the planning period in early PY 2011. This program has high levels of freeridership due to customer familiarity with ENERGY STAR brand and continues to fail the TRC Test.

SWEPCO continues to experience barriers within its portfolio similar to those findings in in prior years. The narrow noncontiguous geographic configuration of SWEPCO's service territory continues to create issues for trade allies and retail partners in all programs. A high proportion of lower income customers and smaller, independently-owned businesses located in rural areas of the state lack the discretionary income necessary for non-essential energy-efficiency investments.

[13] Appendix A, Cadmus Evaluation Report, p. 9

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1.2.7 Planned Changes to Programs or Budgets

The Company sought and gained Commission approval to make several budgetary and program changes for implementation in PY 2016. If necessary, SWEPCO will again shift funds between programs within the Commission's budget flexibility guidelines to assist the stronger performing programs. SWEPCO plans to only shift funds and savings from programs that are not expected to reach goal or require the full amount of the approved budget (ABudget).

Commercial and Industrial Programs

The Company received approval to formally change the name of the Targeted Standard Offer Program (TSOP) to Commercial & Industrial Energy Efficiency Program (CIEEP). In addition, SWEPCO received approval to reduce the total PY 2016 program budget for the CIEEP to $3,450,000 (from $4,738,819) which more accurately reflects the CIEEP's past performance in the market place. Although this program has been substantially impacted by the SD option, this program continues to contribute the greatest amount of net energy savings to the Company's overall net portfolio energy savings. The Company has been using its approved Budget Flexibility in PY 2013 through PY 2015 to shift dollars from this program to the Small Business Direct Install (SBDI) Program. The Company also received approval to change its incentive structure to a "kWh only" incentive. This "energy only" incentive structure more closely aligns with the incentive structures offered by both Entergy Arkansas, Inc. (EAI) and Oklahoma Gas & Electric (OG&E). The measures offered through the CIEEP will remain the same except for solar PV which SWEPCO removed as a measure in PY 2016. Solar PV does not pass the Total Resource Cost (TRC) Test at the measure level and is having a negative impact on this program's and SWEPCO's overall portfolio cost-effectiveness under the TRC Test.

Residential Programs

Two significant changes were approved for SWEPCO's residential programs in PY 2016. The first change was the merging of the AWP into the Company's Home Performance with ENERGY STAR Program (HPwES). The Company modified its currently approved HPwES Program to follow the design guidelines of the "Consistent Approach for Weatherization" that were approved by Order Nos. 22 and 23 in Docket No. 13-002-U. Second, SWEPCO launched a Residential Lighting & Appliance Program (RLA) Program beginning in PY 2016 by combining the cost effective measures within the Company's now closed Residential ENERGY STAR Appliance Program (RESAP) and Residential Lighting Program (RLP). This new program includes

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ENERGY STAR clothes washers, Compact Fluorescent Lighting (CFLs), Light Emitting Diodes (LEDs), and the addition of Advanced Power Strips (APS). Advanced Power Strips are proving to be very cost-effective under the TRC test and are now being offered through an on-line store along with CFLs and LEDs.

In summary, given the program design and budgetary modifications that were approved for implementation beginning in PY 2016, SWEPCO foresees that it will only seek minor modifications to its programs and portfolio for implementation in the PY 2017 – PY 2019 program cycle.

1.2.8 Estimation of EE Resource Potential

The Company provided substantial data for and actively participated in all discussions regarding the statewide EE Potential Study that was filed with the Commission on July 2, 2015 in Docket No. 13-002-U. SWEPCO generally asserts that the EE potential identified by the study under all four scenarios (low, medium, high, and carbon) is reasonable but conservative as compared to what the Company has been able to achieve in the market place. See Sections 1.2.1 and 1.2.4 above. The following table represents achievable potential under the medium spending for SWEPCO as presented in the Final EE Potential Study.

Table 3
EE Potential – Medium Spending Scenario – Navigant Potential Study 2015

Medium Scenario	2016	2017	2018	2019	2020
Residential Incentive	$ 3,132,747	$ 2,727,692	$ 2,985,719	$ 3,141,991	$ 3,218,446
Commercial Incentive	$ 2,770,964	$ 2,932,215	$ 3,205,565	$ 3,424,349	$ 3,596,886
Total Admin	$ 3,365,006	$ 3,432,306	$ 3,500,952	$ 3,570,971	$ 3,642,391
Total Electric	$ 9,268,717	$ 9,092,214	$ 9,692,236	$ 10,137,311	$ 10,457,723
Achievable Potential (Net GWh)	25.93	26.55	29.86	31.90	29.71

All Sectors as a Percent of Net Sales	1.0%	1.0%	1.1%	1.2%	1.1%
First Year Net Acquisition Cost ($/KWh)	$ 0.36	$ 0.34	$ 0.32	$ 0.32	$ 0.35

1.2.9 Training Achievements

SWEPCO and its Implementation Staff attended and hosted numerous training and informational events as detailed in the training sections of the Standardized Annual Report Packet (SARP) Workbook. Some examples are as follows:

- SWEPCO hosted various training and informational events for customers and contractors throughout the year. These events covered topics including the proper use of duct testing equipment, variable frequency drives, refrigeration, and the use of the new OPEN tool. Contractors also received individual training

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as needed on the OPEN tool, program guidelines and procedures, and CoolSaver.

- Members of the Implementation Staff participated in training opportunities at Association of Energy Services Professionals (AESP) conferences, Arkansas Chapter of The Association of Energy Engineers (AAEE), and through Arkansas Manufacturing Solutions (AMS).

- SWEPCO staff attended trainings throughout the year to gain increased knowledge regarding marketing of energy efficiency and improvements in technology. Some examples of the training attended include AESP conferences and brown bag events, AMS classes, AAEE conference, and Arkansas Advanced Energy Foundation (AAEF) events.

A SWEPCO staff member made a presentation at its implementer's All Client Round-up held in Austin in October, and was also a panelist at the American Council for an Energy Efficient Economy (ACEEE) conference held in Little Rock in September. A SWEPCO staff member also participated as a panelist at the AAEE Annual Energy Efficiency Conference. SWEPCO staff was active on AESP Committees during the year, and an implementation contractor staff member is a member of the HPwES Southeast Collaborative Leadership Committee. Arkansas is part of the Southeast Collaborative.

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2.0 Portfolio Programs

2.1 Load Management Standard Offer Program

2.1.1 Program Description

This program is a non-tariff based demand response (DR) program that targets large commercial and industrial customers with a minimum peak electric demand of 250 kW or greater. The minimum contract amount of demand reduction required is 250 kW per customer. When SWEPCO calls for a curtailment event, the participating customers are requested to implement their load reduction plan. The maximum number of hours a customer may be called upon in any Program Year (PY) is 49 hours, including a one-hour test. Events are limited to a maximum of four hours in duration and no more than three events in a program month. LMSOP customers are notified at least one hour prior to an unscheduled event via telephone, e-mail and text.

SWEPCO installs interval data recorders (IDR) at LMSOP customer sites where an IDR is not already present. Prior to the program period, SWEPCO and the contracted LMSOP customers perform a one hour scheduled curtailment test to determine a customer's ability to comply with the 250 kW minimum required curtailment threshold.

Prior to the summer of PY 2015, SWEPCO established criteria to call for program curtailments when SWEPCO's peak load was anticipated to be at least 93% of the projected peak. By mid-program month July, it became evident that milder temperatures were preventing system load from reaching the predetermined 93% of system forecasted peak threshold. The Company made a decision to lower the pre-determined curtailment threshold of 93% system peak to 92% in order to potentially increase the number of program curtailments. As a result of this threshold reduction, two unscheduled curtailment events were initiated on July 27th and July 29th. The Company again made a decision in early August to lower the curtailment threshold from 92% system peak to 91%. As a result of this threshold reduction, one additional unscheduled curtailment event occurred on August 10. After August 10, SWEPCO's peak load did not meet the 91% projected peak threshold that would prompt a curtailment event for the remainder of the program period.

The August 10th curtailment event coincides with SWEPCO's 2015 summer peak demand.

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In PY 2015, the average daily maximum temperature over the program period, June 1 through September 30, was higher on average and higher temperature days were more prevalent than in 2014. The number of days during the PY 2015 program period when the temperature exceeded 90° increased by 63% as compared to the PY 2014 program period, while the average monthly maximum temperature increased by 5°. Precipitation also decreased by 51% as compared to PY 2014 program period. There were 91 days where the maximum temperatures exceeded 90°F, compared to 56 such days in PY 2014 and 77 days in PY 2013 during the program periods, respectively. Precipitation during the PY 2015 program period was low with only 8.2 inches of rainfall as compared to 16.7 inches in PY 2014 and 12.2 inches in PY 2013.[14]

2.1.2 Program Highlights

SWEPCO paid $229,052 in monetary incentive to ten customers (19 meters) that were capable of reducing electrical peak demand with a minimum one hour advance notice during the program months of June through September. The incentive RBudget was $284,640. The Company paid each of the ten participating customers $20/kW based on the average kW reduction during the program period. In addition, the Company paid $0.25 for every kWh reduced during an event period. The total expenditures in PY 2015, including incentives, were $283,642, versus an RBudget of $341,640.

Program staff keeps all LMSOP participants informed of other SWEPCO energy efficiency programs. Eight CIEEP projects were completed by LMSOP participants during PY 2015 accounting for 2,353,491 kWh of gross energy savings, a 370 kW demand reduction and $304,832 incentives paid. Two of the remaining three LMSOP customers have identified potential CIEEP projects and are waiting on management approval to proceed with implementation. The remaining customers are in the process of identifying and implementing EE improvement projects.

While no customer satisfaction surveys were completed as part of the PY 2015 evaluation, the LMSOP program manager reports customer satisfaction remains high with no program issues, and the most notable customer request was for more curtailment events.

[14] Appendix A, Cadmus Evaluation Report, p. 99

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2.1.3 Program Budget, Savings & Participation

Load Mngmnt Stndrd Offer Program (LMSOP)												
	Cost			Energy Savings (kWh)			Demand Savings (kW)			Participants		
Program	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2013	$ 379,600	$ 251,817	66%	490,000	64,885	13%	10,000	7,167	72%	20	9	45%
Program Year 2014	$ 342,600	$ 254,159	74%	320,000	113,828	36%	10,000	8,751	88%	20	20	100%
Program Year 2015	**$ 341,640**	**$ 283,642**	**83%**	**200,000**	**126,729**	**63%**	**10,000**	**9,868**	**99%**	**20**	**19**	**95%**

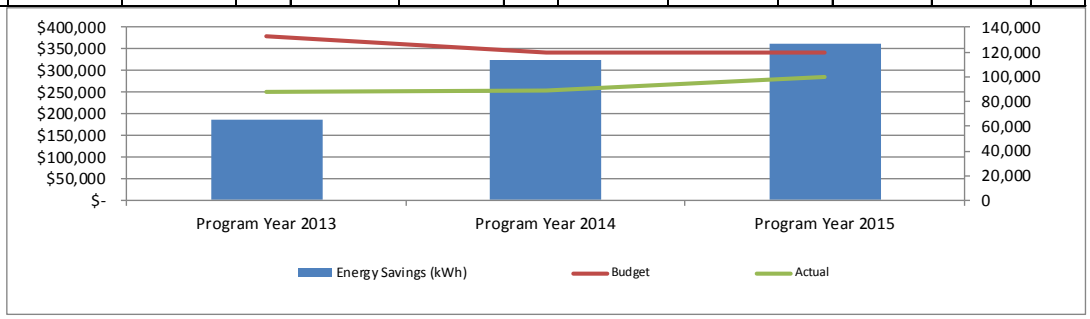

Figure 5 – Load Management Standard Offer Program Trends

2.1.4 Description of a Participant for this Program

This program is a non-tariff based demand response (DR) program that targets large commercial and industrial customers with a minimum peak electric demand of 250 kW or greater. The minimum contract amount of demand reduction required is 250 kW per customer. In PY 2015, the Company defined a Participant as a meter.

2.1.5 Challenges & Opportunities

The LMSOP achieved 99% of its demand reduction target and 63% of its energy-savings target. SWEPCO considers both its five-day demand forecast and its knowledge of the available generating units when making unscheduled curtailment decisions. "Consistent with prior years, LMSOP accounted for the majority (62%) of SWEPCO's portfolio demand reductions…."[15]

[15] Appendix A, Cadmus Evaluation Report, p. 11

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Challenges

- There were three unscheduled events in PY 2015. The same number of unscheduled events occurred in PY 2014. The most unscheduled events in a PY occurred in PY 2011 with nine events. In previous PY's, temperatures have been the driving force for the initiation of curtailment events since they were in direct correlation to system peak demand.
- There are a limited number of program eligible customers under current program design. A customer must be able to reduce demand by a minimum of 250 kW.
- Customer cost for inclusion in the cost effectiveness analysis is minimal and difficult to quantify since a significant number of the customers curtail load without on-site generation. No customers have indicated any lost opportunity cost. SWEPCO and Cadmus have agreed to utilize 5% of the incentive cost, or $11,452.60, as the participant cost in the appropriate benefit cost tests analysis.

Opportunities

- Continue to keep LMSOP participants informed of other SWEPCO energy efficiency programs. Seven of the ten customers have participated in the CIEEP, and the remaining three are reviewing potential EE projects.
- Continue to keep non-participating eligible customers informed of LMSOP program and its benefits
- Consider amending criteria for when events are initiated by lowering the forecast system peak threshold
- Consider amending the current Customer Agreement during the PY 2017 – PY 2019 portfolio filing to increase the number of eligible customers by lowering the minimum eligible demand reduction criteria[16]

2.1.6 Planned or Proposed Changes to Program & Budget

No program design changes are planned for PY 2016. The approved budget (ABudget) for the LMSOP is $342,000 for PY 2016.

[16] Appendix A, Cadmus Evaluation Report, p. 109

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2.2 Commercial & Industrial Energy Efficiency Program

2.2.1 Program Description

The Targeted Standard Offer Program (TSOP) continued to be marketed as the Commercial and Industrial Energy Efficiency Program (CIEEP). This program targets SWEPCO's Arkansas commercial, industrial, municipal, school, and hospital customers. Incentives are paid to customers or project sponsors for the installation of a wide range of EE measures that reduce peak demand and save energy in qualifying non-residential facilities with peak demands greater than 50 kW of annual usage. Savings are determined through the use of the currently approved Technical Reference Manual (TRM) deemed savings or through custom Measurement and Verification (M&V) plans employing point-of-use metering. Project measures eligible for incentive payments include replacement of existing installations of lower efficiency electric end-uses. In addition to the retrofit market, this program also applies to new construction or expansions. The primary EE measures targeted include, but are not limited to, lighting, plug loads, HVAC equipment, variable frequency drives, and compressed air. SWEPCO markets this program both internally and through its Implementation Team as well as leveraging the relationships of its Account Managers as part of its overall marketing strategy.

Project sponsors, trade allies, contractors/vendors, architectural firms, engineering firms, and Community Allies are encouraged to actively promote energy efficient projects.

2.2.2 Program Highlights

- In PY 2015, the CIEEP achieved 123% of the planned net energy savings goal and 127% of the net planned demand savings goal.[17] Furthermore, the evaluation report concluded that the CIEEP had its strongest year since inception in PY 2015, achieving considerable increases in gross kWh and kW savings compared to PY 2014, up 40% and 96% respectively. In addition, the program achieved 100% more completed projects in PY 2015 compared to PY 2014.[18]

- In PY 2015, new measures were added to the program in an effort to increase energy efficiency comprehensiveness. This effort will continue through customer program and trade ally awareness, introduction of new

[17] Appendix A, Cadmus Evaluation Report, Table 17, p. 30
[18] *Id.*

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measures, and utilizing the customer relationships to discover energy efficiency opportunities. New measures included novelty cooler controls, refrigeration gaskets, and strip curtains. Approximately 191 MWh of evaluated savings were attributed to strip curtains and refrigeration gaskets.

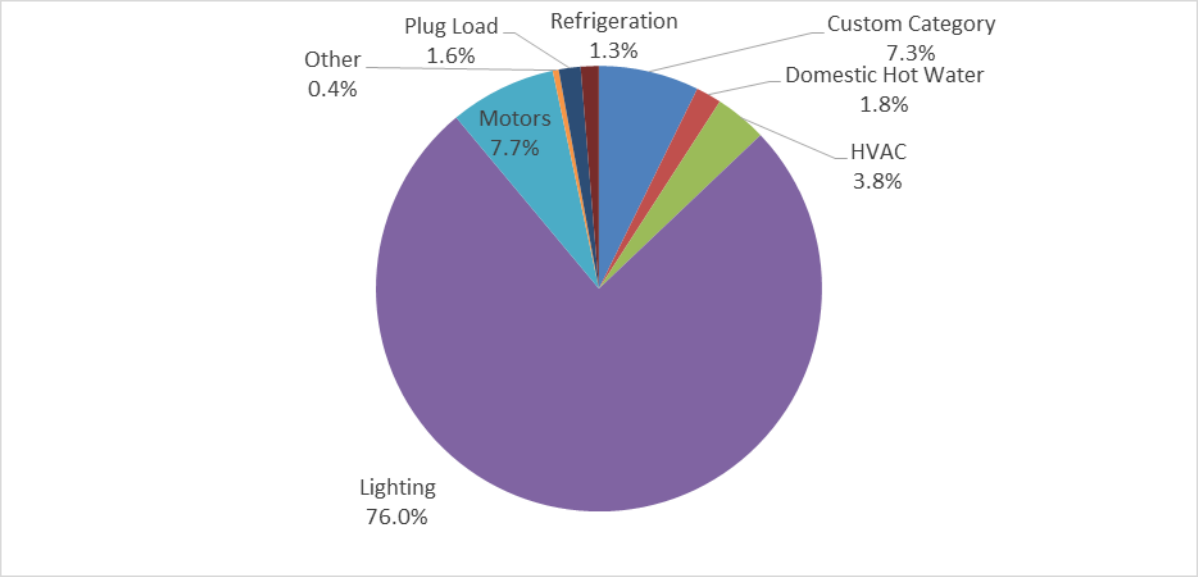

Figure 6 - Net kWh Savings Achieved by Measure

Figure 6 highlights program comprehensiveness through multiple energy efficiency measures.

The Company continued inter-utility collaboration with SourceGas (now known as Black Hills Energy) including:

- Co-sponsored the Fayetteville Chamber of Commerce Manufacturing Appreciation Banquet, including a presentation of the utilities' EE program offerings
- Jointly sponsored the Fayetteville Chamber of Commerce Construction and Developers Awards Banquet
- Jointly sponsored the Arkansas Association of Energy Engineers Annual Conference

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Educational and communications effort with trade allies were enhanced, including:

- Emailed three newsletters to program contractors with programmatic and technical updates
- Organized two well attended educational luncheons which provided information on LED and other advanced lighting technology
- Held two trade ally appreciation luncheons, which included awards for high performing trade allies
- Supported four trade ally counter days with various vendors
- Held CoolSaver^{SM} HVAC Tune-up training for interested contractors

The following information was obtained from the evaluation surveys of participating customers that were conducted by Cadmus:

- "Four program participants reported installing five spillover measures for which they did not receive a rebate, and said that the program was important in their decision to install the measure.'[19]
- When asked, "What factors were important in your decision to participate [in the CIEEP]?" The top three responses were; to save money on electric bills, to obtain a rebate from SWEPCO, and to save energy.[20]
- All customers surveyed indicated that they were satisfied with both SWEPCO and with the CIEEP- twenty one of the twenty two customers surveyed were "very satisfied" with the CIEEP.[21]

Implementation Staff increased communication with customers by expanding media and events, including:

- Conducted two direct email campaigns which provided program information to commercial customers
- Utilized a bill insert campaign to increase program awareness for commercial customers

[19] Appendix A, Cadmus Evaluation Report, p. 47
[20] *Id.*, p. 48
[21] *Id.*, p. 49

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- Employed digital billboards
- Promoted the CIEEP at local and regional venues, including:
  - Trade ally counter days
  - Arkansas Association of Energy Engineers Annual Conference
  - Public school teacher expos
  - Chamber of Commerce events

Many success stories were relayed by customers to the Implementation Team. A few notable examples were:

- The advanced lighting luncheon, which was attended by both SWEPCO customers and trade allies, directly impacted equipment purchases for an upcoming project. After learning about advances in LED technologies and how proper light dispersion impacts lighting design and energy use, the customer revised his request for proposals.
- A non-profit organization worked with the Implementation Team to identify, quantify, and realize both electric and gas savings with a custom HVAC Control project. What follows is a quote from the Chief Operating Officer of this organization, ***"With a heated pool and an indoor year round ice arena, our utility consumption was very high for a community center. They [the SWEPCO and SourceGas (now known as Black Hills Energy) teams] partnered with us to help meet our energy challenges through rebates for conservation projects and guidance through the [incentive] process. Without the rebates, our project would have been deferred; however, we are redirecting former utility funds into youth programming as a result of our utility savings."***
- Beyond energy savings, improvements in workplace environment were realized by the elimination of T12 fluorescent bulb striation after the customer installed LEDs. An office employee reported that her headaches ceased after the project was completed.

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Implementation Staff continued to enhance its energy efficiency knowledge through trainings offered by Arkansas Manufacturing Solutions and Energy Efficiency Arkansas such as:

- Pumping System Optimization
- Commercial Heating and Cooling
- Building Systems Training

The Company continued to cross promote both the CIEEP and the SBDI program, which has consistently increased customers' satisfaction. Implementation Staff continued to successfully utilize direct install and refrigeration measures to increase measure comprehensiveness.

Implementation Staff observed continued market transformation in that program participants from previous program years sought input on more comprehensive EE projects beyond lighting.

SWEPCO diligently pursued HVAC controls, refrigeration, compressed air, and variable frequency drive projects; however, lighting measures accounted for the single largest percentage of savings in the program for PY 2015. The rapid decline in LED fixture and LED lamp costs[22] along with the increase in efficacy are likely the factors that have contributed to the increased adoption of this technology by customers.

The Implementation Staff utilized several key metrics to track the progress of the program between program years. The table below summarizes the improvement in a few of these key metrics from PY 2014 to PY 2015.

Table 4 - Percentage Change from PY 2014 to PY 2015

	% Change From PY 2014
Walk Thru Assessments Completed	+ 9%
Projects Completed[23]	+ 100%

[22] Appendix A, Cadmus Evaluation Report, p. 31
[23] *Id.*, p. 30

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2.2.3 Program Budget, Savings & Participants

Targeted Commercial & Industrial SOP (TSOP)												
	Cost			Energy Savings (kWh)			Demand Savings (kW)			Participants		
Program	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2013	$ 4,433,922	$ 2,632,767	59%	16,214,833	14,501,399	89%	2,090	2,286	109%	469	212	45%
Program Year 2014	$ 4,265,404	$ 2,511,253	59%	14,646,600	11,169,561	76%	1,904	1,438	76%	243	118	49%
Program Year 2015	**$ 4,264,937**	**$ 3,769,378**	**88%**	**15,000,000**	**15,686,716**	**105%**	**2,613**	**2,816**	**108%**	**220**	**236**	**107%**

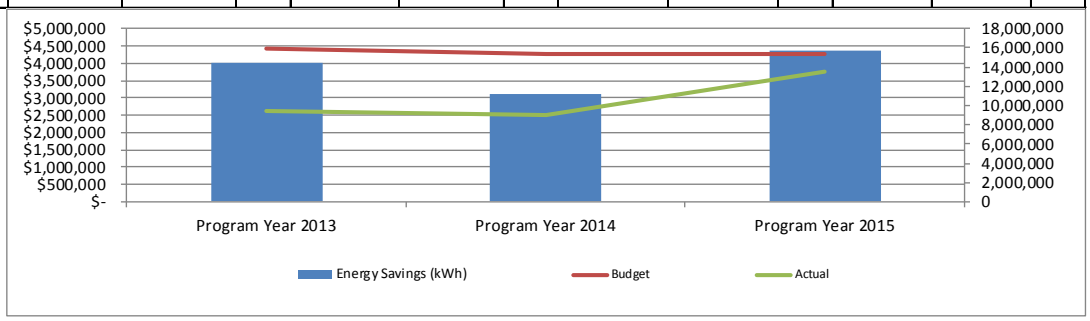

Figure 7 – Targeted C&I Standard Offer Program (a/k/a CIEEP) Trends

2.2.4 Description of a Participant for this Program

SWEPCO's definition of a program participant is a completed project. As previously stated, program eligibility extends to all commercial and industrial customers with a minimum peak demand of 50 kW or annual energy consumption greater than 200,000 kWh.

2.2.5 Challenges & Opportunities

Challenges

- Several large usage customers continue to consider the Self-Direct option. This challenge continues to be addressed by providing Self-Direct customers updates of any program changes that may influence their decision to re-enroll in the program.
- Demand for the program has increased; however, average kWh per project has decreased by nearly 5%. The number of projects completed has increased by 100% from PY 2014. While the cost-effectiveness of the CIEEP increased substantially in PY 2015, staffing levels remained relatively flat. Going forward, these factors could present challenges with efficiently processing more projects with the same level of staffing.

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- The year-over-year trend indicates that the Implementation Staff need to continue their efforts to identify additional savings opportunities or phase the project to meet customer needs and achieve program goals.

Opportunities

- Program awareness and number of projects undertaken is steadily increasing. Because of this, a shared resource (between residential and commercial programs) will be hired to increase availability for QA/QC inspections.
- The relationships SWEPCO has established with customers, especially managed accounts, present an opportunity for Implementation Staff to develop energy efficiency strategies that will meet the business needs of these customers.
- The relationships developed with previous participating customers continue to present an opportunity to explore deeper energy savings with various technologies beyond lighting. Implementation Staff can facilitate the identification and quantification of these opportunities and/or the introduction to resources with the necessary industry expertise.
- From a commercial building perspective, the Implementation Staff have identified a substantial opportunity to offer dual fuel incentives. One such opportunity is in the area of building tune-ups which will be vetted through the EM&V process prior to implementation.
- Trade allies are beginning to see the Program as an important aspect of their business model. SWEPCO has noted that a few trade allies are considering expanding their capabilities to work within programs outside of the CIEEP.
- Implementation Staff have the opportunity to increase the savings associated with point-of-sale air compressors by applying "the maximum power value from the air compressor's CAGI data sheet rather than the air compressor's nominal power, based on the implementer's work paper from October 21, 2014."[24]

[24] Appendix A, Cadmus Evaluation Report, p. 50

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2.2.6 Planned or Proposed Changes to Program & Budget

In PY 2016, SWEPCO received approval to change the methodology for calculating project incentives. The incentive budget was decreased to $2,100,000 and the gross energy savings goal was increased to 15,123,000 kWh. This change was initiated to align the program budget and savings with prior program years' performance. With the rapid adoption of LED technology within the program, the incentive level may need to be increased in future years.

For PY 2017 – PY 2019, a proposal to change customer eligibility requirements is being considered. Currently, non-residential customers with a peak demand greater than 50 kW are eligible to participate in the CIEEP. In addition, SWEPCO is considering changing this requirement to a peak demand greater than 100 kW. This would align the Program with other utility programs in the region and could potentially increase measure diversification within the SBDI. On average, fifty projects per year are completed in the CIEEP for customers with a peak demand between 50 kW and 100 kW. This change will likely decrease the number of projects completed in the CIEEP and will require program staff to increase their current efforts to uncover deeper savings per project.

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2.3 Small Business Direct Install Program

2.3.1 Program Description

The Small Business Direct Install (SBDI) Program targets commercial customers with a maximum demand of up to and including 50 kW. The program offers incentives for measures such as lighting, lighting controls, water heating, and refrigeration controls. The SBDI Program is a contractor-driven program with the majority of the program marketing, site assessments, and project installations being performed by trade allies. SWEPCO pays incentives to the participating trade allies who deduct the incentive amount from their customers' project costs.

2.3.2 Program Highlights

- In PY 2015, SBDI achieved 108% of the planned net energy savings goal and 175% of the net planned demand savings goal.[25]
- Energy savings increased by 24% over PY 2014, resulting in savings of 5,170,426 kWh.[26] Implementation Staff continue to focus on geographic regions with historically lower participation rates, and on diversification of measure contribution to program savings

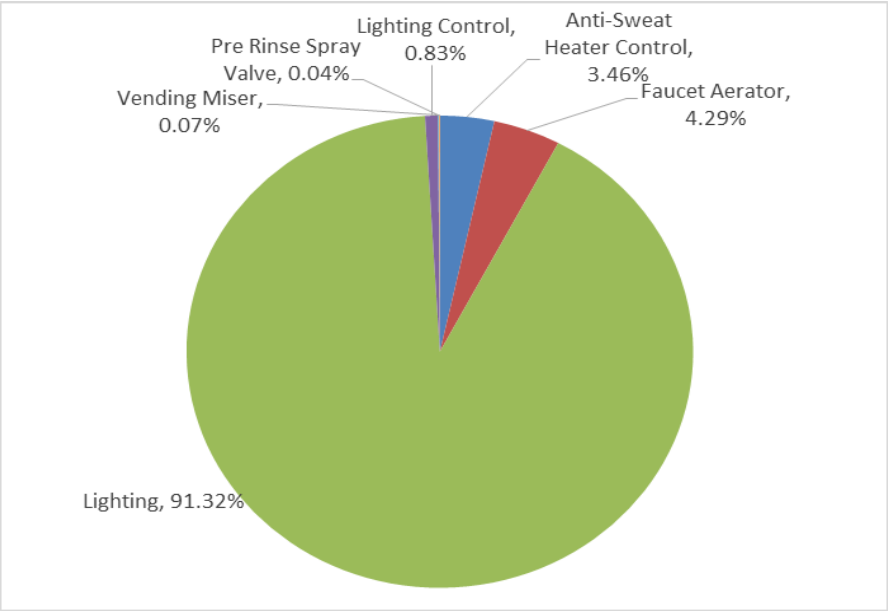

Figure 8 – Net kWh Savings Achieved by Measure

[25] Appendix A, Cadmus Evaluation Report, Table 52, p. 84
[26] *Id.*

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- Provided education to contractors through Lunch & Learn events which were jointly promoted with the CIEEP
- Participated in promotional booths at local and regional events which promoted both SBDI and CIEEP
- Increased communications with trade allies by:
  - Creating three contractor newsletters with technology and program updates
  - Sponsoring two trade ally appreciation luncheons, which included awards for high performing trade allies
  - Supporting four trade ally counter days with various vendors
  - Organizing CoolSaver HVAC tune-up contractor training
- Increased communication with customers by expanding media outlets and events through:
  - Two direct emails sent to customers
  - One bill insert included for commercial customers
  - Two Community Ally events held to provide program awareness to customers and local community leaders
  - Billboard ad campaign
- Increased program comprehensiveness by:
  - Incorporating commercial HVAC tune-ups
  - Recruiting refrigeration trade allies
- Increased trade ally satisfaction by:
  - Increasing energy auditing software reliability
  - Decreasing project submission times
  - Revising software to allow for multiple facility types on a single project

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2.3.3 Program Budget, Savings, & Participants

Small Business Direct Install (SBDI)												
	Cost			Energy Savings (kWh)			Demand Savings (kW)			Participants		
Program	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2013	$ 785,001	$ 785,001	100%	2,794,163	3,310,599	118%	697	594	85%	116	222	191%
Program Year 2014	$ 1,059,155	$ 1,062,837	100%	4,583,434	4,157,613	91%	798	791	99%	316	253	80%
Program Year 2015	**$ 1,081,432**	**$ 1,123,735**	**104%**	**4,800,000**	**5,170,426**	**108%**	**500**	**877**	**175%**	**260**	**283**	**109%**

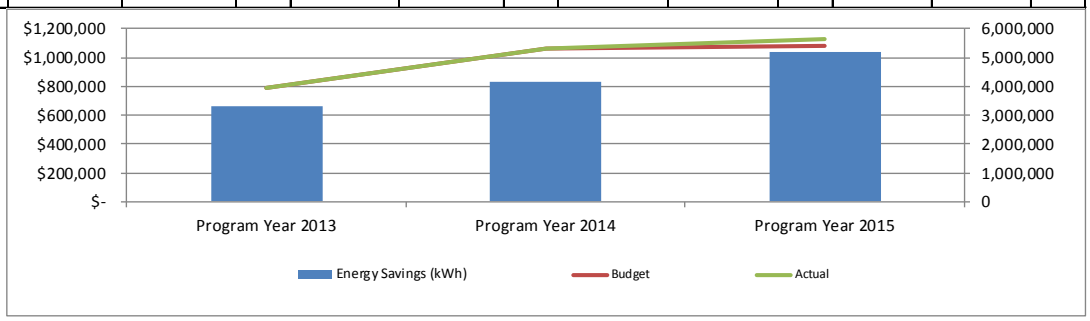

Figure 9 – Small Business Direct Install Program Trends

2.3.4 Description of Participants

SWEPCO considers each SBDI project to be a participant.

2.3.5 Challenges & Opportunities

During the PY 2015 evaluations, the results of the trade ally survey indicated some contractors encountered difficulty utilizing the SBDI program software (i.e. Open). Issues such as project submittal reliability and the ability to submit both outdoor and indoor area types under a single project were resolved in PY 2015. However, enhancements to the tool to increase speed, allow more flexibility, and improve the user interface will be launched in PY 2016.

Challenges

- The decrease in baseline wattage from standard T12 systems to standard T8 systems could present a significant challenge in PY2016. This challenge could potentially be minimized if the cost of LED systems continues to decrease and the efficacy of these systems increases.

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- In SWEPCO's service territory, most facilities with loads beyond HVAC and lighting typically experience peak demands greater than 50 kW. As previously referenced, this presents a challenge to realizing diversity in measure contribution.

Opportunities

- While SWEPCO successfully engaged several underserved markets in PY 2015, there remains an opportunity to increase participation rates in SW Arkansas and West Central Arkansas. This will continue to be a focus in PY 2016.
- Implementation Staff recognized HVAC tune-ups as an opportunity for PY 2015; however, adoption of this measure has been slower than desired. SWEPCO will increase outreach efforts for this measure in PY 2016 by adding qualified contractors to the network and targeting property management firms and strip mall owners.

2.3.6 Planned or Proposed Changes to Program & Budget

The PY 2016 incentive budget has been increased to $816,000 with a 5,168,000 kWh goal.

For PY 2017 – PY 2019, a proposal to change customer eligibility requirements is being considered. Currently, non-residential customers with a peak demand no greater than 50 kW are eligible to participate in the SBDI. Further, SWEPCO may change this requirement to a peak demand no greater than 100 kW. This would align the Program with many of the utility programs in the region. On average, fifty projects per year are completed in the CIEEP for customers with a peak demand between 50 kW and 100 kW. This change will likely increase the number of projects completed in the SBDI program, and present an opportunity to diversify measure mix in the SBDI program

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2.4 Residential Lighting Program

2.4.1 Program Description:

The Residential Lighting Program (RLP) was designed to reduce the initial costs associated with the purchase of ENERGY STAR qualified CFLs and LEDs and increase their penetration in the market. The CFL and LED incentive was delivered to customers through a point-of-purchase (POP) discount. SWEPCO bought down the cost of qualifying ENERGY STAR CFLs and LEDs at partner retailers. All retail customers received buy-down pricing and no prequalification was conducted at the point-of-purchase. SWEPCO marketed this program through an integrated marketing campaign in-store point-of-purchase signage with partner retailers and Community Allies.

2.4.2 Program Highlights

- In PY 2015, the RLP achieved 98% of the planned net energy savings goal and 387% of the net planned demand savings goal.[27]
- Implementation Staff conducted program kick-off meetings with all manufacturers who participated in the RLP program. These meetings were designed to introduce program contacts and discuss topics such as Memorandum of Understanding (MOU) status, program launch for new vendors, in-store signage and training, billing, and additional marketing or promotion opportunities throughout the year.
- Implementation Staff completed extensive field training which resulted in improved retailer inspection practices and in-store marketing.
- Implementation Staff performed routine retailer visits to inspect signage and incentivized stock. In addition, they routinely contacted the partner retailers via telephone and e-mail to check program delivery status and explain any program delivery questions or matters. In most instances with big box retailers, store managers are difficult to engage so the majority of the communication is with department managers. This level of management is much more receptive to the program and is able to interact with the floor sales staff more effectively.

[27] Appendix A, Cadmus Evaluation Report, Table 30, p. 52

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- SWEPCOgridSMART.com content was updated to include more ENERGY STAR informational pieces and photos to educate customers on energy efficiency.
- Implementation Staff participated in 99 outreach events, interacting with approximately 4,400 people at events, including home shows, chamber of commerce meetings, school expos, and community festivals.
- LED offerings were expanded to include omni, specialty, flood, and reflector style bulbs that obtained ENERGY STAR certification at the end of PY 2014.
- An online retail marketplace for LEDs and CFLs was made directly available to SWEPCO customers via email marketing. The online marketplace conducted a limited time offer pilot promotion which consisted of 500 energy efficiency kits containing six CFLs, one LED A-lamp, and one advanced power strip. The kit was priced at $10.00, which included shipping, and was limited to two kits per household. The promotion was fully subscribed in approximately three hours, proving to be extremely successful.
- A quarterly budget evaluation was maintained to maximize retailer sales and ensure program availability throughout PY 2015.
- Implementation Staff attended the ENERGY STAR Products Partner meeting, which covered lighting and appliance industry news and program best practices.
- Market neutrality was maintained with manufacturer and retailer partners by supporting all retailers and manufacturers equally.
- Google Analytics continued to be utilized to evaluate website traffic by tracking track web hits, bounce rates, unique hits, and returning users. In addition, a monthly analysis was received from its web designer that included: a ranking of specific website pages visited, the forms downloaded and quantity, the most commonly searched zip codes, the most common traffic sources that drove users to the program website, and the top-performing campaigns based on unique identifier website links printed on marketing pieces.
- RLP material was provided to RSOP and HPwES trade allies for their use in recruiting potential customers.
- Two Community Ally lunch meetings were hosted to provide program awareness to customers and local community leaders in SW Arkansas.

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2.4.3 Program Budget, Savings and Number of Measures:

Residential Lighting Program (RLP)												
	Cost			Energy Savings (kWh)			Demand Savings (kW)			Participants		
Program	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2013	$ 500,238	$ 483,577	97%	3,794,355	4,178,591	110%	414	762	184%	26,900	28,176	105%
Program Year 2014	$ 569,276	$ 562,907	99%	4,484,176	5,097,919	114%	721	930	129%	54,198	41,459	76%
Program Year 2015	**$ 580,141**	**$ 610,585**	**105%**	**7,000,000**	**4,335,870**	**62%**	**345**	**840**	**243%**	**47,083**	**43,157**	**92%**

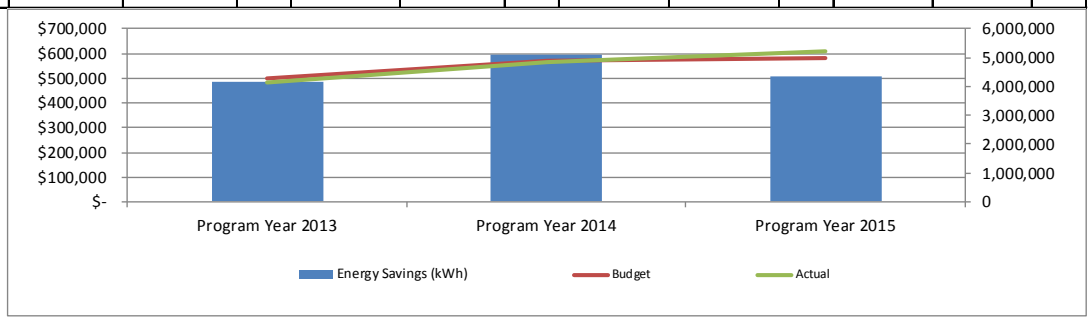

Figure 10 – Residential Lighting Program Trends

2.4.4 Description of Participants

As included in SWEPCO's portfolio, a participant was defined as a residential customer purchasing six CFL bulbs or four LED bulbs.[28]

2.4.5 Challenges & Opportunities

During the evaluation of the PY 2015 program, SWEPCO's evaluator incorporated best practices from the Uniform Methods Project (UMP) and a demand elasticity model to evaluate freeridership. Although RLP targeted residential customers, changes made to TRM 5.0 allocated 6.7% of bulbs purchased to small business applications. This allocation methodology is based on the UMP recommended best practices.

Challenges

- The point-of-purchase instant markdown delivery approach utilized by SWEPCO allowed for greater market penetration and influence compared to other delivery methods. This method created challenges within SWEPCO's unique service area as it is conducive to leakage. Additionally, retailers have specific protocols in place that prohibit best practice evaluation

[28] SWEPCO's evaluator reported a Participant as single bulb sale in PY 2012. SWEPCO has always defined a Participant as a customer purchasing six CFL bulbs. With the program change in PY 2014, the definition added the four LED bulb options.

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techniques such as in-store surveys. As a result, the determination of the appropriate freeridership, spillover, and net-to-gross adjustments will continue to be a challenge when performing program evaluation.

- The Energy Independence and Securitization Act of 2007 (EISA 2007) which phased out the use of traditional wattage incandescent lamps continued to present challenges. These changes limit the savings that can be achieved from CFLs and LEDs particularly since 40 watt and 60 watt changes went into effect in PY 2015.
- During PY 2015, LED product uptake was much faster than anticipated causing several manufacturers to exhaust their LED budget before year end.
- LEDs continue to be an emerging product in a fast moving lighting market. The changing technologies make it difficult for customers to understand their efficacies and applications.
- Non-ENERGY STAR, value LEDs entered the market in mid-2015 negatively impacting sales of more expensive ENERGY STAR certified LEDs in the program.
- Some retailers and manufacturers started exiting out of CFLs in Q4 of PY 2015, a trend expected to continue in PY 2016 due to the popularity of halogens and changes to ENERGY STAR certification requirements. Several manufacturers will not be producing CFLs that meet ENERGY STAR V2.0 requirements in PY 2016.
- The evaluation contractor found that freeridership associated with LED products sold through this program was higher than expected; the evaluation contractor attributed this to a relatively low incentive rate, less aggressive promotional activity, and with consumer characteristics that tend to favor lower priced products.[29]

Opportunities

- Due to the PY 2015 net-to-gross evaluation of LEDs, consideration will need to be given to program changes that will mitigate LED freeridership, such as increased incentive levels.
- Due to the success of the online marketplace limited time offer promotion, SWEPCO will offer two larger promotions in PY 2016.

[29] Appendix A, Cadmus Evaluation Report, p. 64

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- LED prices came down significantly in PY 2015, and that trend is expected to continue into PY 2016 which will allow the incentive level to be a higher percentage of the original retail price.
- Increasing the promotion of LEDs during PY 2016, including off-shelf and end-cap, should help decrease freeridership.
- ENERGY STAR V2.0 requirements will expand LED options on the market, allowing some value LEDs to obtain ENERGY STAR certification.
- Due to the fast paced change in the lighting market, SWEPCO will focus on customer and sales associate education to help its customers make lighting choices based on lamp application, efficacy, color and brightness, and technology type.

2.4.6 Planned or Proposed Changes to Program or Budget

Beginning in PY 2016, SWEPCO's RLP was combined with RESAP creating a new program, the Residential Lighting and Appliance Program (RLA). The new program will include point-of-purchase incentives on ENERGY STAR CFLs and LEDs, plus mail-in rebates for ENERGY STAR clothes washers and APS. SWEPCO's approved RLA incentive budget for PY 2016 is $400,000 with a gross energy savings goal of 6,804,000 kWh. Another program modification is the change in the definition of participant from the number of bulbs purchased by a customer to the number of total bulbs sold (see footnote 28 above). As LEDs become a greater percentage of the lighting measures incented through this program, the energy savings goal may be reduced in PY 2017 and beyond, depending upon changes in the lighting market and Implementation Staff's ability to mitigate freeridership.

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2.5 Residential ENERGY STAR® Appliance Program

2.5.1 Program Description

The Residential ENERGY STAR Appliance Program (RESAP) targeted SWEPCO's Arkansas residential customers, and was designed to reduce the initial costs associated with the purchase of ENERGY STAR qualified appliances, specifically refrigerators, clothes washers, and window air conditioners. The RESAP incentive was delivered to customers through a mail-in incentive process or an online rebate center utilizing partner and non-partner retailers. Qualification and other requirements were verified prior to incentive payment. SWEPCO marketed the program through an integrated marketing campaign, in-store point-of-purchase signage with partner retailers, and community allies.

2.5.2 Program Highlights

- Attracted 516 participants in PY 2015, which was a decrease of 43% from the 905 participants in PY 2014
- Continued an integrated marketing plan, which emphasized the need for seasonal home comfort and lower energy costs through participation in the program. Marketing tactics included bill messages, bill inserts, digital billboards, direct email, internet, magazine, newspaper, radio, and TV advertising.
- Conducted various types of customer and retailer outreach, including the following:
    - Home shows, chamber of commerce meetings and events, school expos, and community festivals
    - Monthly retailer visits to inspect signage, train sales associates, and discuss special signage requests
- Offered an online rebate center, allowing customers to complete an online appliance rebate application, upload a copy of their receipt, and select a rebate check or VISA pre-paid credit card. The online center provided instant application receipt confirmation, status changes via email, and used a program survey to capture customer feedback.
- Continued market neutrality in terms of retailer partners

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- Continued the use of Google Analytics to evaluate website traffic. SWEPCO and its program implementer utilized Google Analytics to track web hits, bounce rates, unique hits, and returning users. In addition, a monthly analysis was received from its web designer that included: a ranking of specific website pages visited, the forms downloaded and quantity, the most commonly searched zip codes, the most common traffic sources that drove users to the program website, and the top-performing campaigns based on unique identifier website links printed on marketing pieces.

- Presented RESAP material to RSOP and HPwES trade allies for their use in recruiting potential customers

- Leveraged RSOP multifamily outreach to raise RESAP awareness and rebate opportunities

- Updated SWEPCOgridSMART.com content to include more ENERGY STAR informational pieces and photos to educate customers on energy efficiency

- Continued the use of a Thank You card mailed to participating RESAP and RSOP customers, cross-promoting programs. The Thank You cards included program contact information and a unique Uniform Resource Locator (URL) identifier to allow tactic effectiveness tracking.

- Hosted two Community Ally lunch meetings to provide program awareness to customers and local community leaders

- Implementation Staff attended the ENERGY STAR Partners Products Meeting, an annual conference hosted by ENERGY STAR that presents industry news and appliance program best practices.

- Year-end data reporting to the evaluator presented fewer challenges in PY 2015 than in PY 2014 due to increased internal QA/QC and mid-year data reporting “test run” which resulted in an overall 100% realization rate for the program.

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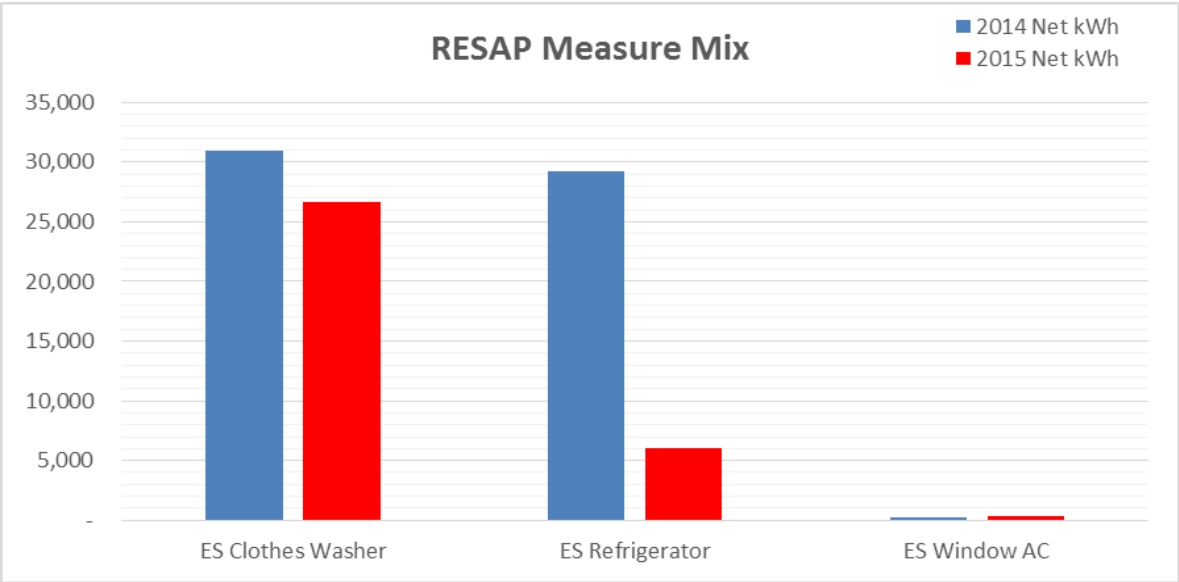

Figure 11 – RESAP Measure Mix By Net kWh Savings Achieved

2.5.3 Program Budget, Savings and Number of Measures:

Residential ENERGY STAR Appliance Program (RESAP)												
	Cost			Energy Savings (kWh)			Demand Savings (kW)			Participants		
Program	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2013	$ 694,580	$ 389,720	56%	632,625	94,618	15%	127	16	12%	2,300	753	33%
Program Year 2014	$ 625,123	$ 317,010	51%	307,005	60,466	20%	62	10	16%	2,433	905	37%
Program Year 2015	**$ 625,013**	**$ 283,846**	**45%**	**150,000**	**32,983**	**22%**	**207**	**6**	**3%**	**1,000**	**516**	**52%**

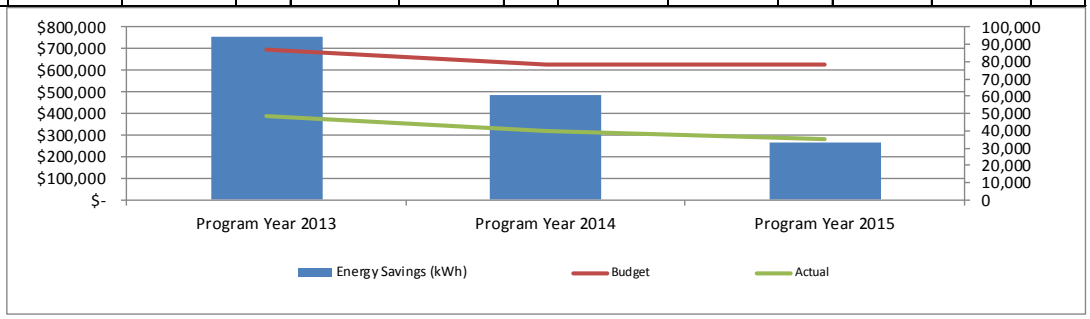

Figure 12 – Residential ENERGY STAR Appliance Program Trends

2.5.4 Description of Participants

For RESAP, a participant was a single ENERGY STAR appliance – refrigerator, clothes washer, or window air conditioning unit.

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2.5.5 Challenges & Opportunities:

PY 2015 was the program's fifth year of implementation, and while the program has shown significant growth since 2012, barriers continued to exist.

Challenges

- The geographic layout of the SWEPCO territory remained a major barrier, creating difficulties for partner retailers to identify eligible customers.
- A high percentage of SWEPCO customers have limited incomes causing a financial barrier to customer participation in the program.
- The program savings goals that were originally approved were high and unrealistic for this market. Consequently, program savings goals were adjusted by transferring budget and energy savings to the SBDI.
- Refrigerator energy and demand savings continued to be impacted by the TRM changes in the prior years. Consequently, all energy and demand savings continued to be calculated based on burn out due to the difficulty in determining the necessary efficiency data of the existing units.
- The Program continued to not be cost-effective under the TRC test. In addition, the Program has high levels of freeridership due to customer familiarity with the ENERGY STAR brand.
- Refrigerator federal standards were updated in September 2014 which resulted in the loss of ENERGY STAR certification for many refrigerator models. The change in federal standards translated to a 32% decrease in single family refrigerator rebates processed in PY 2015 as compared to PY 2014.
- Multifamily customer participation dropped in PY 2015. Outreach to properties through RSOP did not generate the interest seen historically in ENERGY STAR product purchases due to the increased cost of upgrading units to certified products. In addition, the loss of lower priced ENERGY STAR refrigerators on the market due to federal standard changes had a negative impact on program participation.
- Refrigerator calculations in TRM 5.0 continued to be calculated by complicated configuration codes, making the measure very challenging to assess and calculate. There are over two dozen different configurations, some with only slight variations from others, presenting a challenge when selecting the

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proper configuration for the measure. As previously stated, early retirement calculations also present challenges in the collection of data on the previously owned units. Customers in most cases do not have that kind of information available which often resulted in misinformation being reported by the customer.

Opportunities

- While this program was discontinued at the end of PY 2015, residential customers will continue to have an avenue to participate through limited appliance offerings in the new RLA Program.
- Expand the use and emphasis of the ENERGY STAR logo and branding to raise RLA Program awareness.

2.5.6 Planned or Proposed Changes to Program or Budget:

The program was eliminated beginning in PY 2016. However, clothes washers and APS will continue to be offered as a mail-in rebate under the new RLA in PY 2016.

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2.6 Residential Standard Offer Program

2.6.1 Program Description

The RSOP targets SWEPCO's Arkansas residential customers. Incentives are paid to customers and service providers (trade allies) for the installation of targeted EE measures that save energy and reduce peak demand in existing residences. Measures eligible for incentive payments include, but are not limited to the replacement of central air conditioners and electric heat pumps, and building envelope measures, such as duct sealing, air infiltration, insulation, and ENERGY STAR windows. SWEPCO markets this program through an integrated marketing campaign, which includes a participating contractor network and other community allies.

2.6.2 Program Highlights

- In PY 2015, the RSOP achieved 140% of the planned net energy savings goal and 63% of the planned net demand savings goal.[30] This was accomplished with only 64% of the budgeted incentives.
- Conducted two kick-off meetings for trade allies to provide PY 2015 documents and updates
- Required all SWEPCO Network trade allies to re-apply for 2015 Program participation in order to remove inactive trade allies, leaving those trade allies that were familiar with the SWEPCO programs and rebate process. Overall 60 trade allies did not re-apply to participate in the SWEPCO program, leaving about 50 active and experienced trade allies.
- Provided in-person program training to new trade allies, reviewing forms, program details, walk-through assessment training, and marketing opportunities
- Conducted in-field training to trade allies to reinforce best practices in duct sealing, air sealing and insulation installation
- Participated in 99 outreach events, interacting with approximately 4,400 people
- Adjusted minimum requirements and rebates on air sealing and duct sealing measures to encourage trade allies to spend more time in the home reducing air and duct leakage

[30] Appendix A, Cadmus Evaluation Report, Table 44, p. 70

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- Created a Top Tier Bonus for trade allies that achieved highest tier leakage reduction levels on both duct sealing and air sealing. Creating this bonus incentivized trade allies to spend more time reducing leakage in the home.

- Implemented an allotment system for higher volume trade allies to ensure year round program availability and increase trade ally consistency and performance

- Conducted program inspections on 7% of the 1,765 completed projects. With a failure of less than 1%, consisting of four single family and one multifamily project, SWEPCO continued to focus on maintaining high quality installation standards. The Implementation Staff followed up on each of the failed projects verifying correction was completed by the installing contractor.

- Conducted two trade ally trainings highlighting insulation best practices and sales and the customer experience

- Utilized a quarterly trade ally newsletter to communicate program news and activities

- Updated SWEPCOgridSMART.com content to include more ENERGY STAR informational pieces and photos to educate customers on energy efficiency

- Continued an integrated marketing plan, which emphasized the need for seasonal home comfort and lower energy costs through participation in the program. Marketing tactics included bill messages, bill inserts, digital billboards, direct email, internet, magazine, newspaper, radio, and TV advertising.

- Continued the use of Thank You cards mailed to participating RSOP and RESAP customers, providing program cross-promotion. The Thank You cards included program contact information and a unique Uniform Resource Locator (URL) identifier to allow tactic effectiveness tracking.

- Updated the Multifamily Pathway process requiring Implementation Staff to initiate property contact, program introduction, and property evaluation prior to trade ally measure installation. Implementation Staff conducted diagnostic testing for duct and air sealing to ensure the property was a viable candidate for program participation. The staff also conducted QA/QC on a sampling of projects before, during, or after installation to ensure quality work throughout the project. These changes resulted in better communication between all project stakeholders and higher property and tenant satisfaction.

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- Sourced a wall mounted advanced power strip to expand direct install offerings for the Multifamily Pathway
- Educated multifamily participants about potential participation in SWEPCO's RESAP and commercial programs
- Continued cross promotion of SourceGas (now known as Black Hills Energy) residential programs to customers and trade allies. Coordinated in-field training and mentoring with trade allies that participate in both programs in order to better align installation practices and quality assurance for dual-fuel customers.
- Hosted two Community Ally lunch meetings to provide program awareness to customers and local community leaders
- Hosted two trade ally appreciation lunch meetings for active trade allies in NW and SW Arkansas

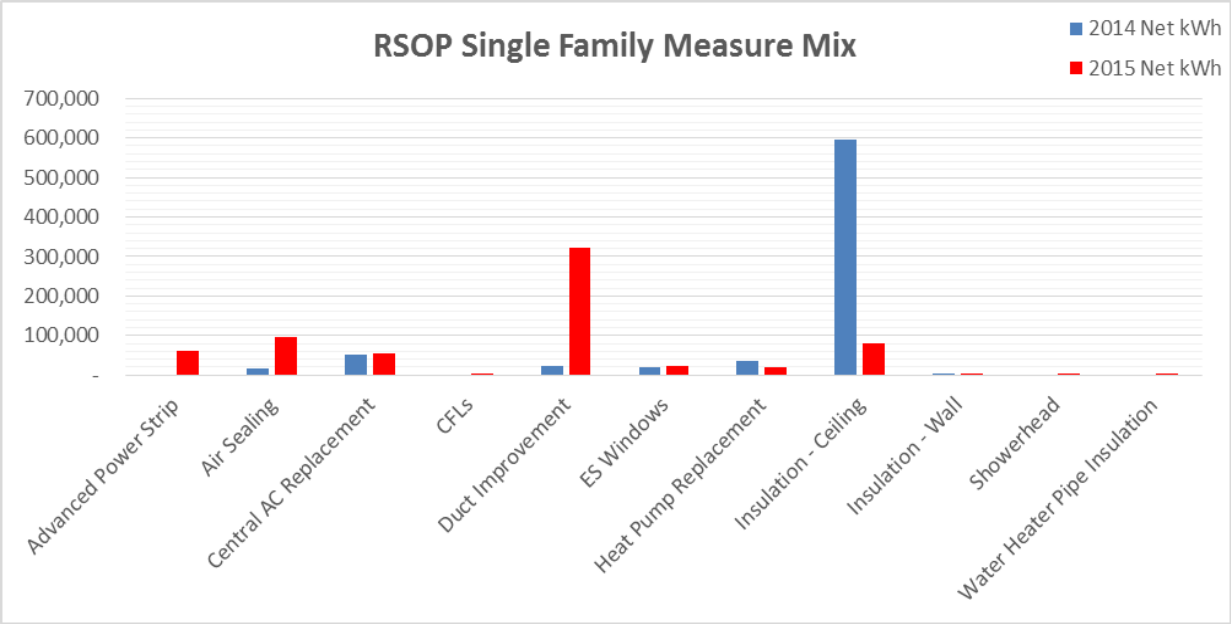

Figure 13 – RSOP Single Family Measure Mix Comparison of Net kWh Savings Achieved

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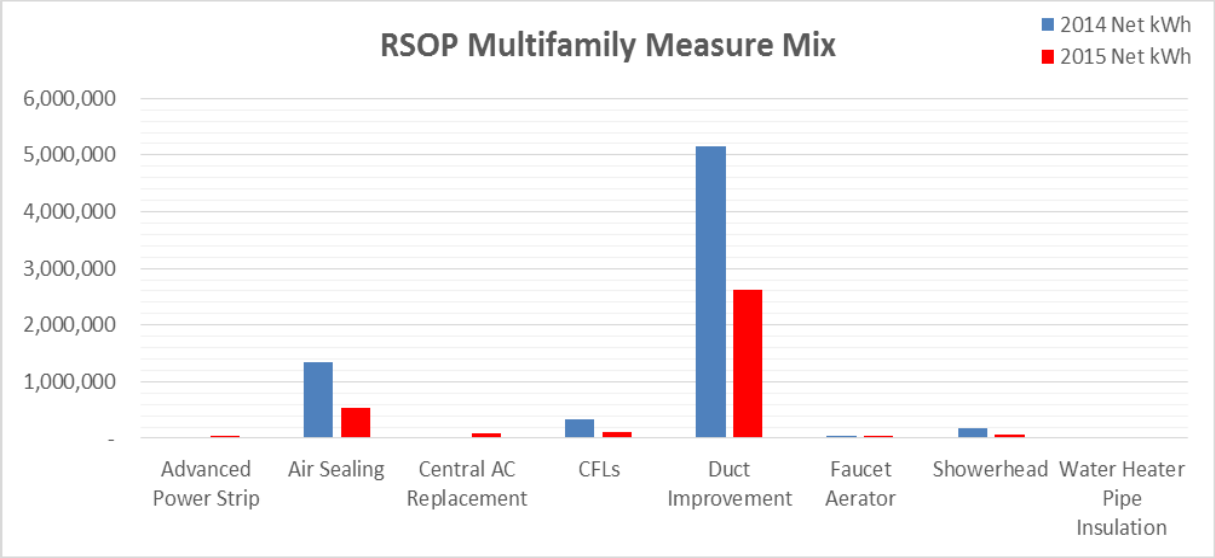

Figure 14 – RSOP Multifamily Measure Mix Comparison of Net kWh Savings Achieved

2.6.3 Program Budget, Savings, and Number of Measures

Residential Standard Offer Program (RSOP)

	Cost			Energy Savings (kWh)			Demand Savings (kW)			Participants		
Program	**Budget**	**Actual**	**%**	**Plan**	**Evaluated**	**%**	**Plan**	**Evaluated**	**%**	**Plan**	**Actual**	**%**
Program Year 2013	$ 1,716,417	$ 1,620,396	94%	2,667,981	2,958,776	111%	1,390	584	42%	9,569	4,770	50%
Program Year 2014	$ 1,716,417	$ 1,612,674	94%	2,668,000	7,807,131	293%	1,390	1,201	86%	9,569	17,487	183%
Program Year 2015	**$ 1,744,518**	**$ 1,291,004**	**74%**	**4,000,000**	**4,144,329**	**104%**	**1,738**	**816**	**47%**	**4,400**	**10,686**	**243%**

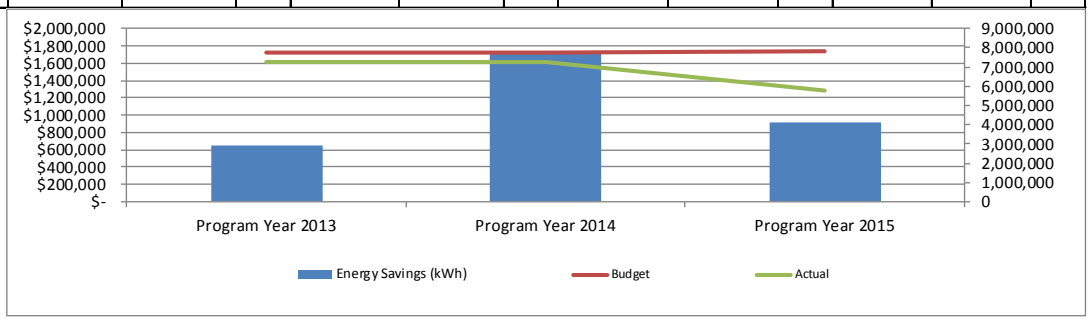

Figure 15 – Residential Standard Offer Program Trends

2.6.4 Description of Participants

For the RSOP, the participant count represents the number of incentivized measures.

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2.6.5 Challenges and Opportunities

The RSOP is in its fifth year of implementation. The geographic layout of the SWEPCO territory still remains a major barrier, creating difficulties for program trade allies to identify eligible customers or specific areas to promote the program. In addition to the geographic challenges, below are a few specific examples of challenges and opportunities:

Challenges

- While the RSOP exceeded its PY 2015 goal, the primary driver continued to be the multifamily pathway. However, the substantial decrease in energy savings as compared to PY 2014 is attributed to Implementation Staff's closely controlling the pursuit and completion of multifamily projects. In addition, there was a substantial drop in ceiling insulation projects in the single family market.

- The percentage of trade allies that actively participate in the RSOP remained lower than desired even though the program required all contractors to reapply in PY 2015.

- Single family customer awareness of the program has improved, but continues to be low.

- There continued to be a broad mix of measures in PY 2015 but the uptake of single family insulation, as well as air conditioner and heat pump replacements, remained low. The ability of contractors to easily identify SWEPCO customers and overall program awareness continue to be barriers to contractor participation.

- SWEPCO's HPwES program was aligned with the approved statewide Consistent Weatherization Approach (CWA) beginning in PY 2016 which offers overlapping measures to RSOP at no cost, could negatively impact RSOP program participation.

- Federal standard changes for air conditioner and heat pumps could render these measures to not be cost-effective in PY 2016.

Opportunities

- The primary driver for RSOP in PY 2015 continued to be the multifamily pathway. SWEPCO expanded the measures available to multifamily properties in PY 2014 and through stricter participation controls implemented in PY 2015,

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saturation of the market is not as significant as an issue as indicated in the Cadmus Evaluation Report.[31] The multifamily pathway will continue to expand measure opportunities with an air conditioner and heat pump tune-up pilot in PY 2016.

- Program staff recommended additional measures for TRM 5.0, such as smart thermostats, enclosed crawl space insulation, and ENERGY STAR pool pumps, in an effort to expand measures offered in PY 2016.
- Program marketing strategy was expanded to incorporate a more targeted digital presence in PY 2016, replacing less effective tactics such as billboards and television ads.
- The program added direct install measures to the Home Walk-through Assessment measure in PY 2016. Adding these DI measures for single family homes will help bridge the gap for homes ineligible to participate in the PY 2016 HPwES program.

2.6.6 Planned or Proposed Changes to Program or Budget

The program design enhancements planned for PY 2016 are listed below:

- The program will expand its measure mix to include ENERGY STAR pool pumps and CoolSaver A/C tune-ups.
- Several underperforming measures such as window film, duct insulation, attic knee wall insulation, and electric water heater replacement will continue to be available, but they will not be actively promoted by the program materials other than on the program website.
- The top tier bonus was removed beginning in PY 2016 and incorporated into the air sealing and duct sealing rebates for the highest leakage reduction tiers.
- Internal QA/QC processes were expanded to include field inspections before, during, and after project completion in PY 2016.
- For PY 2016, the minimum requirement for air conditioner and heat pump seasonal energy efficiency ratios (SEER) was set at 15 SEER in anticipation of code changes.

[31] Appendix A, Cadmus Evaluation Report, p. 70

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The approved RSOP annual gross energy savings goal for PY 2016 was increased to 4,294,000 kWh; and the program incentive budget was reduced from $1,030,444 to $600,000. This is based upon prior experience of achieving goal with a lower incentive spend, and the anticipated impact related to the CWA.

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2.7 Home Performance with ENERGY STAR® Program

2.7.1 Program Description

The Home Performance with ENERGY STAR Program (HPwES) targets SWEPCO's Arkansas residential customers. The program connects eligible customers with a network of trained service providers (trade allies) to perform comprehensive home energy assessments, install EE improvement measures that save energy, reduce peak demand, and improve indoor comfort, air quality and safety in existing residences. Measures eligible for incentive payments include, but are not limited to comprehensive energy assessments, central air conditioner and electric heat pump replacement, and building envelope measures such as duct sealing, air infiltration, insulation, and more. SWEPCO markets HPwES through an integrated marketing campaign, which includes a participating contractor network and other community allies.

The national HPwES Program is a Department of Energy (DOE) and Environmental Protection Agency (EPA) backed program that endorses a "whole-house" approach where each project begins with a comprehensive home energy assessment. SWEPCO remains the first and only ENERGY STAR Sponsor in Arkansas of the HPwES Program. Based on the major success of this program during PY 2015, SWEPCO made application for, and was awarded the 2016 ENERGY STAR Partner of the Year Award. This was the second consecutive year for SWEPCO to receive this award.

2.7.2 Program Highlights

- In PY 2015, the HPwES Program achieved 160% of the planned net energy savings goal and 111% of the planned net demand savings goal.[32]
- Conducted two kick-off meetings for trade allies to provide PY 2015 documents and updates
- Adjusted minimum requirements and rebates on air sealing and duct sealing measures to encourage trade allies to spend more time in the home reducing air and duct leakage
- Added APS as a direct install measure

[32] Appendix A, Cadmus Evaluation Report, Table 75, p. 121

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- Created a Top Tier Bonus for trade allies that achieved highest tier leakage reduction levels on both duct sealing and air sealing. Creating this bonus incentivized trade allies to spend more time reducing leakage in the home.
- Implemented an allotment system for higher volume trade allies to ensure year round program availability and increase trade ally consistency and performance
- Received the 2015 ENERGY STAR Partner of the Year Award for Energy Efficiency Program Delivery
- ENERGY STAR awarded three HPwES participating contractors with the HPwES Century Club Award for having completed over 100 HPwES projects during PY 2015. Implementation Staff presented these awards to each contractor and recognized each during the Contractor Appreciation events.
- Incorporated Home Performance with ENERGY STAR V1.5 Sponsor Guideline changes into program during PY 2015
- Conducted two trade ally trainings highlighting insulation best practices and sales and the customer experience
- Attended the Affordable Comfort Institute's (ACI) Home Performance Conference where Implementation Staff presented a SWEPCO program overview, successes, best practices and lessons learned to attendees during an HPwES break-out session
- Provided scholarships to two HPwES contractors to attend the ACI Home Performance Conference, covering the registration fee
- Participated in 99 outreach events, interacting with approximately 4,400 people
- Utilized a quarterly trade ally newsletter to communicate program news and activities
- Continued an integrated marketing plan, which emphasized the need for seasonal home comfort and lower energy costs through participation in the program. Marketing tactics included bill messages, bill inserts, digital billboards, direct email, internet, magazine, newspaper, radio, and TV advertising.
- Continued inter-utility coordination with the SourceGas (now known as Black Hills Energy) Home Energy Savings Program to cross promote the programs and maximize marketing and project inspection efforts

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- Mentored contractors in the field to foster a learning environment and develop best practices
- Continued the use of a customer follow-up Thank You card for customers that received a home energy assessment but did not install any major measures in an effort to increase participation
- Updated SWEPCOgridSMART.com content to include more ENERGY STAR informational pieces and photos to educate customers on energy efficiency
- Provided software, training, and equipment scholarships for eligible trade allies. The scholarship payments consisted of $300 for assessment software, $700 for training, and $2000 for assessment equipment.
- Hosted two Community Ally lunch meetings to provide program awareness to customers and local community leaders in SW Arkansas.
- Hosted two trade ally appreciation lunch meetings for network trade allies in NW and SW Arkansas
- The program experienced a great deal of success in PY 2015. Restructuring incentives for single family homes to promote deeper energy savings, combined with a project allocation system for contractors, resulted in the completion of 767 single family homes, a decrease of 24% from PY 2014, but with 1.8 GWh in energy savings which was an increase of 11% over PY 2014. The average kWh per project increased 31%.
- Due to the APSC directive in Orders No. 22 and 23, Docket 13-002-U, SWEPCO will transition HPwES into SWEPCO's offering for the Consistent Weatherization Approach in PY 2016. In preparation for this change, SWEPCO provides the following highlights:Prepared and issued a Request for Qualifications (RFQ) for PY 2016 HPwES program contractor participation. Each application was reviewed and scored in order to maintain a high quality base of contractors for the program. Once the contractors were selected, the Implementation Staff conducted individual meetings to discuss participation.
    - Hosted a PY 2016 HPwES Program Kick-off and Training meeting to review the redesigned program and best practices with participating contractors

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- Strategized with Arkansas Oklahoma Gas and SourceGas (now known as Black Hills Energy) on joint implementation of the CWA for PY 2016
- Participated in the development of a joint utility Contractor Portal for the CWA

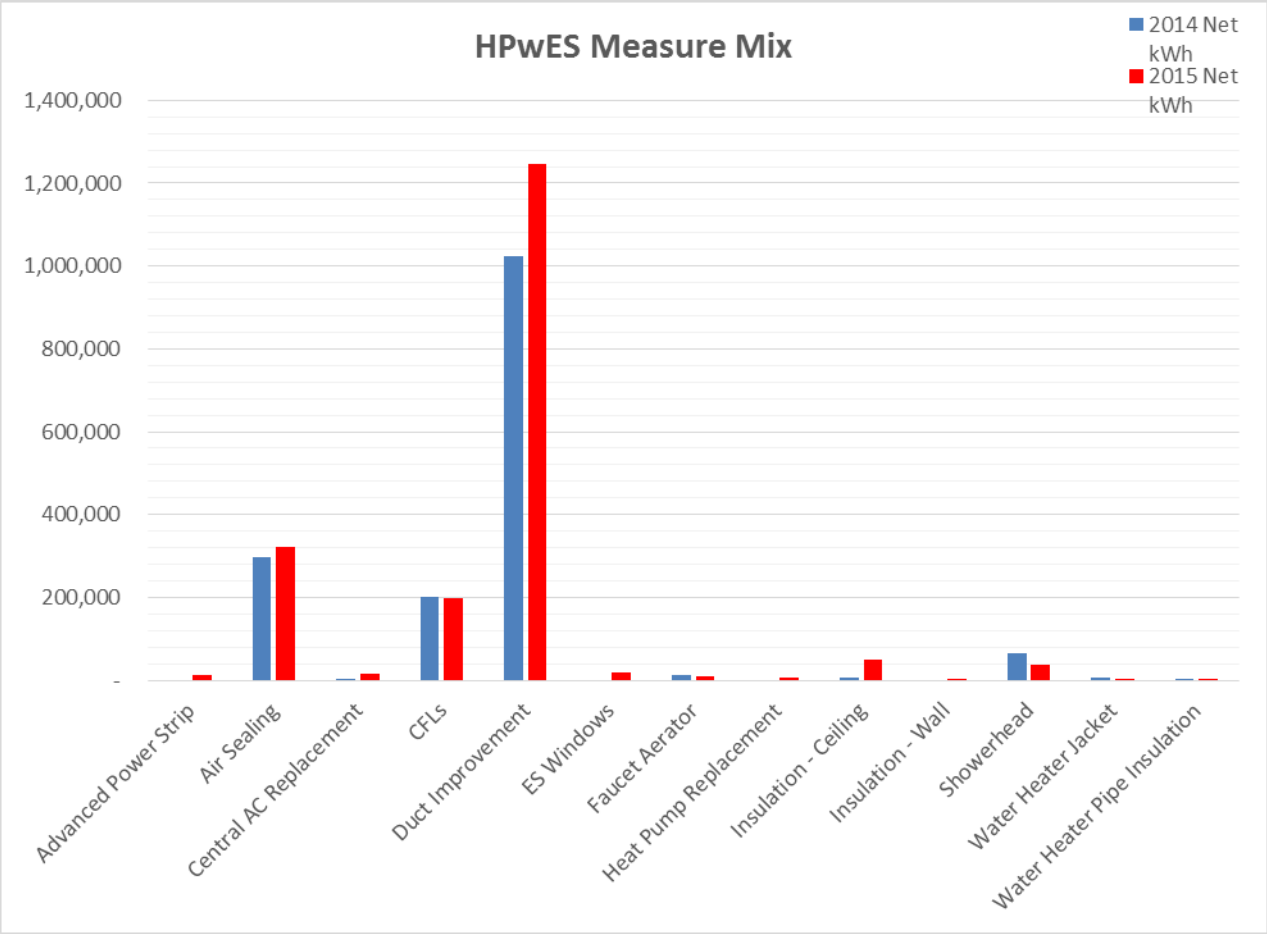

Figure 16 – HPwES Measure Mix Comparison of Net kWh Savings Achieved

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2.7.3 Program Budget, Savings and Number of Measures

Home Performance w/ ENERGY STAR (HPwES)												
	Cost			Energy Savings (kWh)			Demand Savings (kW)			Participants		
Program	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2013	$ 1,222,545	$ 386,409	32%	995,954	230,810	23%	531	65	12%	5,750	246	4%
Program Year 2014	$ 1,151,518	$ 1,101,743	96%	887,280	1,617,865	182%	465	386	83%	911	3,298	362%
Program Year 2015	**$ 1,170,294**	**$ 1,112,410**	**95%**	**1,500,000**	**1,921,282**	**128%**	**716**	**634**	**89%**	**3,200**	**11,598**	**362%**

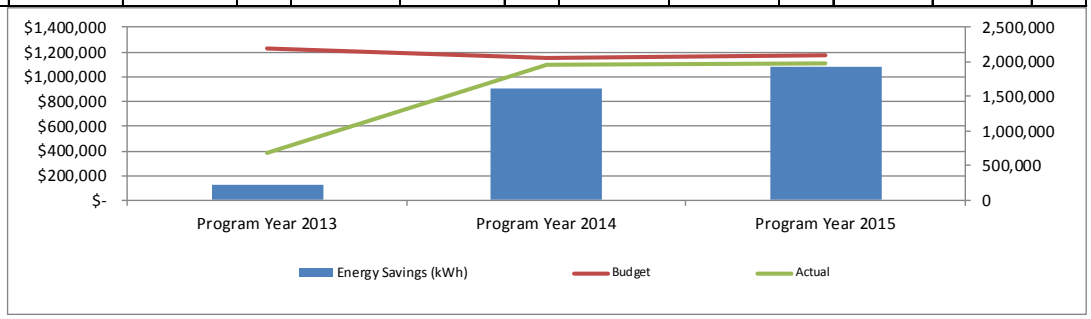

Figure 17 – Home Perfomance w/ENERGY STAR (HPwES) Trends

2.7.4 Description of Participants

For HPwES, the participant count represents the number of incentivized measures.

2.7.5 Challenges & Opportunities

PY 2015 was the fourth year of implementation for HPwES. The geographic layout of the SWEPCO territory remains a major barrier, creating difficulties for program trade allies to identify eligible customers or specific areas to promote the program. In addition to the geographic challenges, below are a few specific examples of challenges and opportunities:

Challenges

- Trade allies are not adequately pursuing comprehensive energy efficiency upgrades beyond direct install measures, duct sealing and air infiltration, which are typically completed at the time of the home energy assessment.
- Single family customer awareness of the HPwES is improving, but there is still room for improvement. Through additional training, trade allies are becoming more effective in promoting the program. This has been enhanced through the execution of an integrated marketing plan.

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Opportunities

- Implementation Staff will continue to assist trade allies in preparing for the changes implemented in PY 2016 due to the introduction of the approved CWA through regular meetings, in-field mentoring, and training opportunities.
- Building Performance Institute (BPI) Building Analyst training was offered at a greatly reduced rate to participating contractors in January 2016. Based on the response from contractors, an additional BPI Building Analyst training could be offered later in the year.

2.7.6 Planned or Proposed Changes to Program or Budget

The program design enhancements planned for PY 2016 are listed below:

- Due to the APSC directives in Order No. 22 and Order No. 23, Docket 13-002-U, SWEPCO will transition HPwES into SWEPCO's program offering for the CWA in PY 2016.
- The approved HPwES annual energy savings goal for PY 2016 increased to 6,064,000 kWh, and the incentive budget increased to $1,960,000 to accommodate the new CWA.
- The PY 2016 program measures include a comprehensive energy assessment, ceiling and wall insulation, duct sealing, air sealing, and direct install measures such as CFLs, LEDs, APS, low flow showerheads and faucet aerators at no cost to eligible customers.
- In order to be eligible for participation in the PY 2016 HPwES program, the home must have a valid SWEPCO residential account and either be 10 years old or older or have had an electric bill in the last 12 months that is $0.10/square foot or higher. The home must also have been occupied for the previous 12 months. The home cannot have participated in a weatherization program offered either through a utility or the government in the past 5 years.
- Bi-monthly meetings will be conducted with contractors in PY 2016 to review performance. As part of these monthly meetings the program will be developing a Contractor Scorecard to provide effective feedback on their performance compared to other participating contractors in the program.
- QA/QC processes will be updated to include pre-installation testing, in-field QA during project installation, and post-installation inspections to ensure participating contractors are performing to required standards.

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2.8 Arkansas Weatherization Program

2.8.1 Program Description

The AWP targeted severely energy inefficient homes, leveraging the resources of the federally funded Department of Energy Weatherization Assistance Program. The AWP was jointly funded by SWEPCO, Entergy Arkansas, The Empire District Electric Company, Oklahoma Gas & Electric Company, and the three natural gas companies, Arkansas Oklahoma Gas, SourceGas (now known as Black Hills Energy), and CenterPoint Energy. This weatherization program provided funding for the state's Community Action Program (CAP) agencies to:

- Facilitate energy audits,
- Provide energy use consultation,
- Reduce infiltration by using blower door tests to identify leaks,
- Install weatherization measures, and
- Install other energy conservation measures as required.

During PY 2015, the federally funded Weatherization Assistance Program (WAP) continued to be administered by the Arkansas Energy Office (AEO). This change in PY 2013 reduced the number of CAP agencies offering weatherization services throughout the state to six. As the AWP was structured, any change to the WAP had a direct impact on the AWP.

A full report of this program is available in the Annual Report filed in Docket No. 07-079-TF.

2.8.2 Program Highlights

SWEPCO results for PY 2015 are as follows:

- Adjusted participation target from 300 homes to 20 homes to better align the participation target with past program performance. During PY 2015, 13 homes were audited and weatherized.

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- In the SWEPCO service territory, the AWP achieved net evaluated energy savings for PY 2015 of 43,922 kWh[33] versus an adjusted targeted energy savings goal of 35,000 kWh.
- The PY 2015 RBudget totaled $394,110 with total PY 2015 expenditures of $5,886. SWEPCO would have reduced its RBudget even further but was restricted by its approved budget flexibility.
- Agency spending for the audit and weatherization of customer homes funded in prior years by SWEPCO amounted to $15,138 and by the WAP amounted to $95,193.

2.8.3 Program Budget, Savings, & Participation

Arkansas Weatherization Program (AWP)

	Cost			Energy Savings (kWh)			Demand Savings (kW)			Participants		
Program	**Budget**	**Actual**	**%**	**Plan**	**Evaluated**	**%**	**Plan**	**Evaluated**	**%**	**Plan**	**Actual**	**%**
Program Year 2013	$ 394,110	$ 102,450	26%	1,056,000	47,714	5%	291	19	6%	250	29	12%
Program Year 2014	$ 412,900	$ 42,069	10%	118,427	31,154	26%	34	8	25%	56	12	21%
Program Year 2015	**$ 394,110**	**$ 5,886**	**1%**	**35,000**	**43,922**	**125%**	**10**	**23**	**231%**	**20**	**13**	**65%**

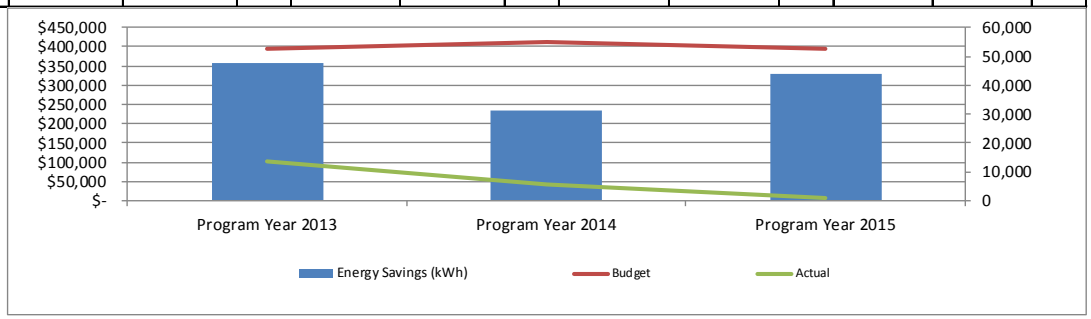

Figure 18 - Arkansas Weatherization Program Trends (SWEPCO only)

2.8.4 Description of Participants

For the AWP, a participant is a single family home.

2.8.5 Challenges & Opportunities

SWEPCO's service territory is served by five Community Action Partner (CAP) agencies. Arkansas Community Action Agency Association (ACAAA) and the Central

[33] Appendix B, ADM Evaluation Report, Table 2-15, p. 2-24

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Arkansas Development Corporation (CADC) promoted the program to all CAP agencies. Three agencies, CADC, Community Action Program for Central Arkansas, Inc. (CAPCA), and Crawford-Sebastian Community Development Council, Inc. (C-SCDC), provided weatherization services to the SWEPCO territory. However, during PY 2015 only CADC weatherized homes in SWEPCO's service territory.

- Participation in PY 2015 of 13 homes weatherized was basically the same as in PY 2014 when 12 homes were audited but only 11 homes weatherized. The continued lack of consistent funding from the WAP combined with participating agencies being directed to prioritize LIHEAP funding over AWP funding for weatherization projects were key barriers to higher program activity.[34]
- As indicated in previous reports, with the program being run by CAP agencies, non-low income customers are hesitant to participate, even if they were aware of the program and its benefits.
- The utilities have no authority over the CADC, and the CADC has no direct authority over the area agencies.

Opportunities

- The Commission approval of the Consistent Weatherization Approach (CWA) in Docket No. 13-002-U allows the utilities to directly administer weatherization programs, replacing the AWP.
- SWEPCO asserts that combining the strengths from several of the existing utility program designs, the recently approved CWA, and other best practices creates the opportunity for a much improved program for residential customers throughout the utilities' Arkansas footprints.

2.8.6 Planned or Proposed Changes to Program & Budget

On August 4, 2015, in Order 87 of Docket 07-082-TF, the Commission approved modifications to the EE Plan for PY 2016, allowing SWEPCO to meet the CWA through use of its Home Performance with ENERGY STAR (HPwES) program.

[34] Appendix B, ADM Evaluation Report, p. 4-1

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The HPwES program as approved by the Commission for PY 2016 has a budget of $2,950,000, estimated participation rate of 1,800 homes, and an estimated net energy savings of 5,700 MWh.

Finally, the Company notes that it received a reimbursement in the amount of $69,605.65 on February 24, 2016 for funds provided to CADC for the AWP that had not been expended. Funds were retained by the CADC to cover the expenses associated with preparing the final AWP Annual Report.

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2.9 Energy Efficiency Arkansas

2.9.1 Program Description

EEA is an energy education program sponsored jointly by the gas and electric utilities of Arkansas. The Arkansas Energy Office (AEO) administers the program. The purpose of EEA is to provide fuel neutral information, education, and training that encourages the people and businesses of Arkansas to consume less energy through energy efficiency and conservation measures. The four primary components of EEA are as follows:

- Education and Information Outreach (Residential)
- Media Promotion
- Commercial and Industrial Education and Information Outreach
- EEA Program Evaluation

Additional details for the overall program is provided in the EEA Annual Report filed May 1, 2016 in Docket No. 07-083-TF.

2.9.2 Program Highlights

- The EEA Facilitator with the Arkansas Energy Office continues to enhance the outreach efforts of EEA, specifically in the promotion of the utilities' energy efficiency programs.
- The EEA Facilitator provided outreach at many events throughout the state, including several within SWEPCO's service territory.
- During PY 2015, the SWEPCO team assisted the Arkansas Energy Office by manning EEA booth during the Arkansas State Fair.
- Details regarding all EEA trainings were provided to appropriate customers and trade allies.

2.9.3 Program Budget, Savings & Participants

The currently approved budget of $34,147 was approved by the Commission in Order No. 31 in Docket No. 07-083-TF, extended through the end of PY 2014 by Order No. 57 in Docket No. 07-082-TF, and again by Order No. 15 in Docket No. 13-002-U for use of

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the existing PY 2014 budget through PY 2015. On April 7, 2015, Order No. 25 in Docket No. 13-002-U, the Commission approved another bridge year through December 2016.

Energy Efficiency Arkansas (EEA)

	Cost			Energy Savings (kWh)			Demand Savings (kW)			Participants		
Program	**Budget**	**Actual**	**%**	**Plan**	**Evaluated**	**%**	**Plan**	**Evaluated**	**%**	**Plan**	**Actual**	**%**
Program Year 2013	$ 34,147	$ 1,144	3%	0	0	-	0	0	-	0	0	-
Program Year 2014	$ 34,147	$ 35,378	104%	0	0	-	0	0	-	0	0	-
Program Year 2015	**$ 34,147**	**$ 36,154**	**106%**	**n/a**	**n/a**	**-**	**n/a**	**n/a**	**-**	**n/a**	**n/a**	**-**

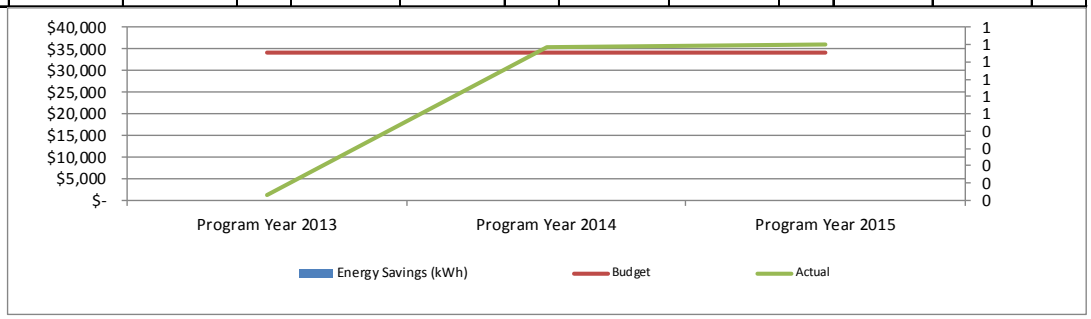

Figure 19 – Energy Efficiency Arkansas Trends (SWEPCO component only)

2.9.4 Description of Participants

This program does not have a participation goal, but SWEPCO considers a participant to be a SWEPCO customer.

2.9.5 Challenges & Opportunities

For information on program challenges & opportunities, see the EEA Annual Report filed May 1, 2016 in Docket No. 07-083-TF.

Challenges

- Although discussions were held to update the EEA website, the plans were not implemented until PY 2016.
- Although a monthly newsletter is distributed, SWEPCO continues to be uninformed of the status of actual expenditures compared to budget.

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Opportunities

- With the implementation of the updated website, the AEO could provide the utilities with information related to the analytics involving the links to utility EE websites. This would be consistent with the intent of the Common C&I Approach which includes National Account customers as approved with the issuance of Order No. 27 in Docket No. 13-002-U on June 8, 2015.
- Additional types of training could be considered for inclusion in the next EEA MOU. Trainings around new EE technology, process improvements, building controls etc. would be beneficial to our customers, trade allies, and the implementation teams.

2.9.6 Planned or Proposed Changes to Program & Budget

SWEPCO has no plans to change its current ABudget of $34,147 unless a revised MOU is filed with and approved by the Commission.

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2.10 On-line Audit Tool (OLAT)

2.10.1 Program Description

The On-line Audit Tool (OLAT) is designed to provide a web-based, do-it-yourself home energy audit that equips residential customers with valuable information to help them manage their energy use and cost. The program is available as an On-line Energy Checkup tool for all SWEPCO Arkansas Customers that have access to the internet. The tool provides functionality that produces a printer-friendly report that factors in weather, local electricity prices and actual customer usage history; estimates monthly and annual energy usages and costs of specific equipment and appliances in the home; customizes energy saving recommendations and potential savings for implemented measures; integrates and displays SWEPCO programs and incentives. Included in the tool are energy calculators (appliance, lighting, heating/cooling systems) and an extensive home energy library.

The tool has been provided as a free service for all SWEPCO Arkansas residential customers since late August, 2011. It provides visibility into monthly and annual energy use and offers insight into the cost of home energy systems and appliances. The tool suggests steps that can be taken to reduce energy consumption, electric bill, and carbon footprint as well as informs the customer of rebates, incentives, and SWEPCO offered programs.

The following applications have been licensed by AEP and SWEPCO:

- Energy*Insights*™ Residential Level 1 Audit: A customer self-service option that is linked to customer billing data and uses Apogee's Home Energy Calculator as the interface. It provides a detailed energy analysis and an auto-generated color-illustrated audit report with analysis results and recommended actions for savings and economics. Performance of the residential building is provided in comparison with a typical home as defined by SWEPCO.

- Progress*Insights*™: This tool contains functionality allowing the customer to monitor their progress toward controlling energy costs online as well as allowing the customer to create an action plan and document the energy savings actions they plan to take. The information captured through the pledge functionality will be provided to SWEPCO through an administrative tool, so that savings can be measured.

- Residential Billing*Insights*™: This tool provides customers with the ability to analyze their bill and energy costs.

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SWEPCO obtained two user interfaces that can be utilized by internal customer service associates through the "Virtual Agent" application already in use at SWEPCO Customer Solution Centers. A streamlined version of this analysis tool is available to the customer service associates (CSA) for use with customers that require hands-on assistance with completing the audit. A link has been embedded in the customer service portal (website) which allows the CSA to see exactly what the customer sees.

Customers also have access to the Residential Energy Systems, Fundamentals of Electricity, and Kids Korner Reference Libraries.

2.10.2 Program Highlights

The On-Line Audit Tool had $11,224 in expenditures against an approved budget of $12,400.

A total of 97 customers completed all sections of the tool, then generated and viewed the detailed report. The report includes suggested actions to improve energy efficiency and potential energy savings if those suggested actions are implemented. It is unknown how many customers may have partially completed the required data fields prior to exiting the tool.

2.10.3 Program Budget, Savings & Participants

Online Audit Tool

	Cost			Energy Savings (kWh)			Demand Savings (kW)			Participants		
Program	**Budget**	**Actual**	**%**	**Plan**	**Evaluated**	**%**	**Plan**	**Evaluated**	**%**	**Plan**	**Actual**	**%**
Program Year 2013	$ 12,400	$ 8,985	72%	0	0	-	0	0	-	0	71	-
Program Year 2014	$ 12,400	$ 8,044	65%	0	0	-	0	0	-	0	94	-
Program Year 2015	**$ 12,400**	**$ 11,224**	**91%**	**n/a**	**n/a**	**-**	**n/a**	**n/a**	**-**	**n/a**	**0**	**-**

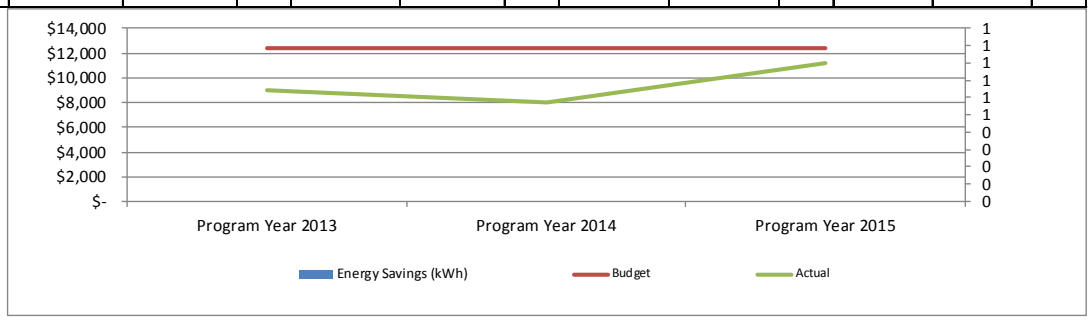

Figure 20– Online Audit Tool Trends

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2.10.4 Description of Participants

A Participant is any SWEPCO Arkansas residential customer who completes a home energy audit using this online tool. All sections must be completed including a detailed report for the home energy audit to be considered complete.

2.10.5 Challenges & Opportunities

Challenges

- The Company continues to be unable to quantify total savings associated with the customers utilizing this tool; however, we are able to identify those customers who have completed the online audit.
- During PY 2015, only three customers who completed the online audit also participated in one of SWEPCO's other energy efficiency programs.
- Customers are required to establish an account and password to access their usage and billing information prior to utilizing the online audit tool. The Company submits that this is one barrier to participation.

Opportunities

- SWEPCO is in the process of reconfiguring the tool in order to allow customers to complete an online audit without establishing an account that links to their historical billing and usage information. While this slightly degrades the quality of the audits produced by the tool, it should increase participation.
- Based on the outcome of a completed audit, links to applicable EE program information will be automatically provided to those customers completing an audit.

2.10.6 Planned or Proposed Changes to Program & Budget

SWEPCO plans to provide customers easier access to the tool as noted above. These changes are currently underway with planned implementation during PY 2016. No significant budget changes are planned for PY 2017 and beyond.

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3.0 Supplemental Requirements

3.1 Staffing

SWEPCO's internal program staffing remained constant through PY 2015. However, the Company's implementation contractor added several new positions. First, a Quality Assurance/Quality Control Coordinator position was added for the residential sector. It is expected that this new position will become even more beneficial as the statewide weatherization program (a/k/a the Consistent Weatherization Approach) grows throughout PY 2016. A new Energy Engineer was also hired in PY 2015 who supports energy efficiency installations across multiple utilities in both the gas and electric utility sectors. This new engineer came from the University of Arkansas Industrial Clearinghouse and has vast experience with the more complex industrial processes and related measure installations. In addition, a new Program Consultant was added in late PY 2015 to support the launch of the Company's new Residential Lighting & Appliance Program. Finally, an Incentive Processor position was added to help manage the increasing number of customer and contractor incentives that are being processed throughout the year.

3.2 Stakeholder Activities

SWEPCO's EE team, including implementation members and evaluation team, was again very active with the Parties Working Collaboratively (PWC). The PWC and its sub-committees held four face-to-face meetings and approximately 14 conference calls in PY 2015. The following is a summary of the matters discussed during these PWC events:

- The Potential Study, including a DRSim overview
- EM&V Reporting
- Freeridership/NTG Methodologies & Policy
- Non-Energy Benefits (NEBSs)
- Consistent Weatherization Approach & Financing
- Financing & associated SEEA RFI
- SEEA EE Codes & Compliance

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- Development of TRM v5.0
- EM&V Costs
- Various Commission EE Order Reviews
- Common C&I Approach

As a result of these PWC meetings, the following is a listing of the Commission filings that were made and Commission orders that were issued:

- Docket No. 13-002-U, March 6, 2015, Joint Motion Requesting Extension of Submittal Deadline for the Next Three-year Program Plan cycle
- Docket No. 13-002-U, April 7, 2015, Commission Order No. 25 granting the Extension of Time for the next Program Cycle and associated conditions
- Docket No. 13-002-U, April 10, 2015, Joint Motion requesting an Extension of Time to submit the Potential Study
- Docket No. 13-002-U, April 14, 2015, Order No. 26 granting Extension of Time to submit the Potential Study
- Docket No. 13-002-U, April 16, 2015, Joint Motion with Testimony of General Staff and Morgan Marketing Partners regarding recommendations for a Common C&I Approach for EE Programs
- Docket No. 13-002-U, April 24, 2015 Joint and Other Party Comments and Recommendations regarding NEBs in Response to Order No. 7
- Docket No. 13-002-U, 10-100-R and various Utility EE Dockets, June 1, 2015, Testimony of General Staff and the IEM Team in support of and recommendations regarding the submission of the PY 2014 Annual EM&V Report Summary
- Docket No. 13-002-U, June 8, 2015, Commission Order No. 27 approving the Common C&I Approach
- Docket No. 13-002-U, June 19, 2015, Commission Order No. 28 approving a delay in filing of the Potential Study and seeking answers to certain questions regarding the Study.

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- Docket No. 13-002-U, July 2, 2015, Testimony of General Staff and the submission of the Potential Study
- Docket No. 13-002-U, July 31, 2015, Joint Comments in Response to Order No. 28 regarding the EE Potential Study and Recommended Goals for the next Program Cycle
- Docket No. 13-002-U, September 30, 2015, Joint Comments and Recommendations in Response to Order No. 22 Concerning Weatherization Financing Options
- Docket 13-002-U, December 10, 2015, Commission Order No. 30 approving the quantification methods for certain non-energy benefits of Energy Efficiency (EE) programs
- Docket 13-002-U, December 17, 2015, Commission Order No. 31 establishing EE goals for PY 2017 – PY 2019
- Docket No. 10-100-R, August 31, 2015, Joint Motion, Supporting Testimony of General Staff and IEM in support of TRM v5.0 and the submittal of TRM v5.0 for Approval
- Docket No. 10-100-R, September 21, 2015, Commission Order No. 30 approving TRM v5.0

In addition to the Stakeholder Activities involving the PWC, the SWEPCO Implementation Staff continued to participate in various activities regarding the EM&V of its EE portfolio. Some examples are as follows:

- Participated in a debriefing between SWEPCO and its evaluation contractor, Cadmus, for the purpose of discussing the PY 2014 evaluation report and plans for PY 2015
- Worked with Cadmus throughout the program year on PY 2014 EM&V report recommendations and specific custom M&V project processes
- Participated in joint utility discussions with Entergy and Cadmus every two weeks to address any EM&V issues and complete the approved PY 2015 EM&V plan on schedule

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SWEPCO again conducted robust EE program outreach as well as numerous trade ally training events throughout PY 2015. These events consisted of program kick-off meetings, contractor appreciation events, trade shows, and Lunch & Learns. One Lunch & Learn in Fayetteville provided training regarding LED technology and was attended by over 70 customers, contractors, and employees. SWEPCO also hosted two Community Ally events, one in Central Arkansas (Mena) and one in SW Arkansas (Texarkana). More detailed information regarding the various outreach and training activities hosted by SWEPCO and its implementation team as well as the teams' PY 2015 trainings can be found in the Training section of the Company's SARP Workbook.

3.3 Information Provided to Consumers to Promote EE

SWEPCO conducted a broad reaching integrated marketing campaign during PY 2015 to promote the portfolio and individual programs while increasing customer awareness of energy efficiency and the availability of SWEPCO's incentives. The call to action included in the majority of the materials was the SWEPCO gridSMART website (www.SWEPCOgridSMART.com) and a phone number. Samples of the materials ranging from bill inserts to bill messages to radio ads to billboards are included in Appendix C to this report.

Additionally, SWEPCO revamped the look and feel of its primary website, www.SWEPCO.com, which included an enhanced focus on energy efficiency. This focus includes program awareness along with tips and tools to help educate customers on the many ways they can save energy in and around their homes and businesses.

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4.0 Appendix A

The Cadmus Group, Inc. – Energy Efficiency Portfolio Evaluation Report 2015 Program Year

Docket No. 07-082-TF

2015 Annual Report

April 29, 2016

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SWEPCO FINAL Energy-Efficiency Portfolio Evaluation Report 2015 Program Year

Docket No. 07-082-TF

April 15, 2016

Southwestern Electric Power Company

101 W. Township Street

Fayetteville, AR 72703

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Prepared by:

Cadmus

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Appendix E: PCMP Memo

Appendix F: Lighting Spillover

Appendix G: Cost-Effectiveness Results by Program

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Glossary of Acronyms

Acronym	Term
ACEEE	American Council for an Energy Efficient Economy
AOH	Annual operating hours
APSC	Arkansas Public Service Commission
AWP	Arkansas Weatherization Program
BPI	Building Performance Institute
C&EE Rules	Rules for Conservation and Energy Efficiency Programs
C&I	Commercial and industrial
CF	Coincidence factor
CFL	Compact fluorescent light (bulbs)
CIEEP	Commercial and Industrial Energy Efficiency Program
DEM	Demand elasticity modeling
DIY	Do-It-Yourself
DSM	Demand-side management
EAI	Entergy Arkansas, Inc.
EEA	Energy Efficiency Arkansas
EER	Energy Efficiency Ratio
EISA	Energy Independence and Security Act of 2007
EM&V	Evaluation, measurement, and verification
HOU	Hours-of-use
HPwES	Home Performance with ENERGY STAR
HVAC	Heating, ventilation, and air conditioning
IEF	Interactive effects factor
IEM	Independent Evaluation Monitor
ISR	In-service rate
IT	Information technology
kW	Kilowatt
kWh	Kilowatt-hour
LED	Light emitting diode
LMSOP	Load Management Standard Offer Program
M&V	Measurement and verification
MW	Megawatt
MWh	Megawatt-hour
NTG	Net-to-gross
PAC	Program Administrator Cost
PC	Personal computer
PCT	Participant Cost Test
QA	Quality assurance
QC	Quality control
RESAP	Residential ENERGY STAR Appliance Program
RIM	Ratepayer Impact

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Acronym	Term
RLP	Residential Lighting Program
RSOP	Residential Standard Offer Program
RSOP MF	Residential Standard Offer Program Multifamily Track
SBDI	Small Business Direct Install
SEER	Seasonal Energy Efficiency Ratio
SWEPCO	Southwestern Electric Power Company
TRC	Total Resource Cost
TRM	Technical Reference Manual
VFD	Variable frequency drive

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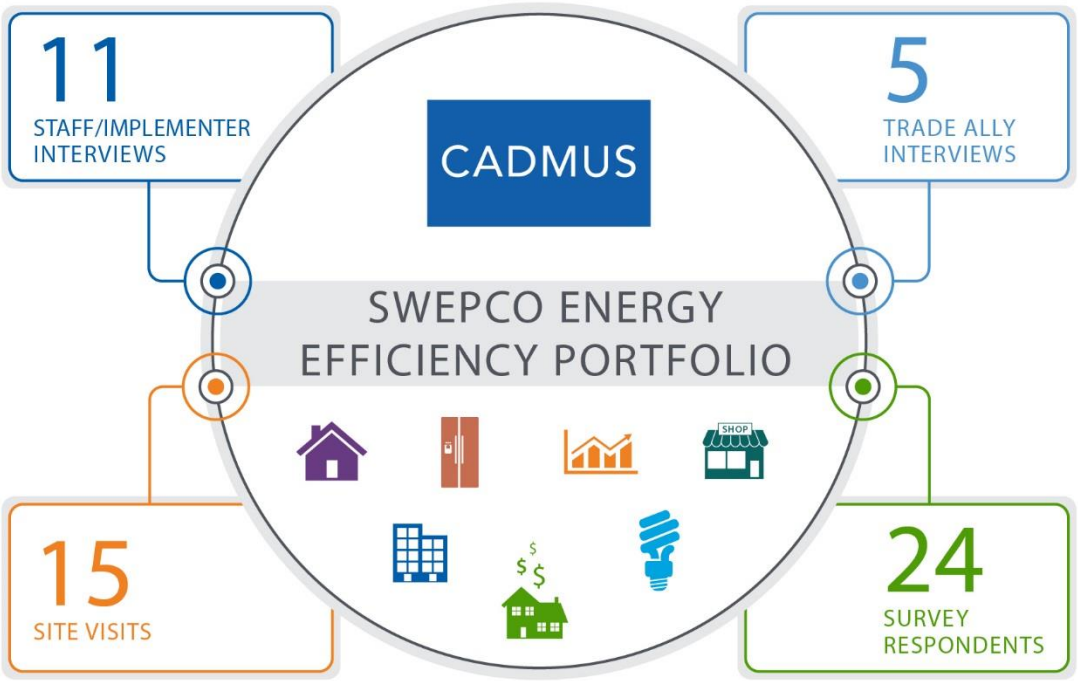
Executive Summary



- SWEPCO exceeded its net energy-savings goal by **29%** while spending **86%** of its portfolio budget
- SWEPCO reduced overall demand on the electrical grid by **15.86 MW**
- SWEPCO's portfolio was cost-effective, achieving a **2.49 TRC ratio**

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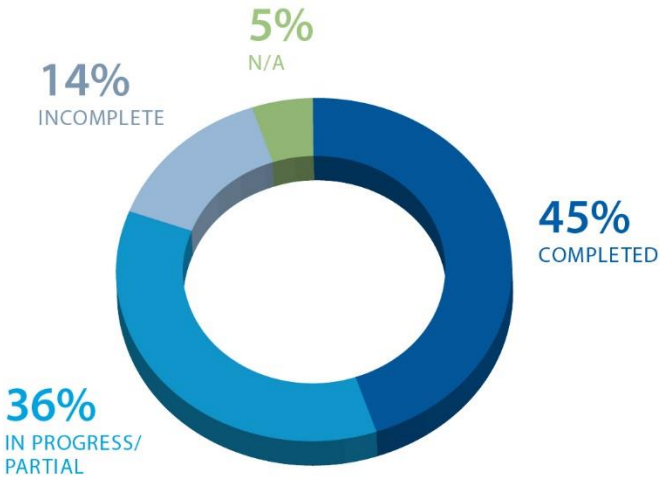
STATUS OF 2013 AND 2014 RECOMMENDATIONS

SWEPCO has completed or is in the process of completing 17 of 22 recommendations from 2013 and 2014



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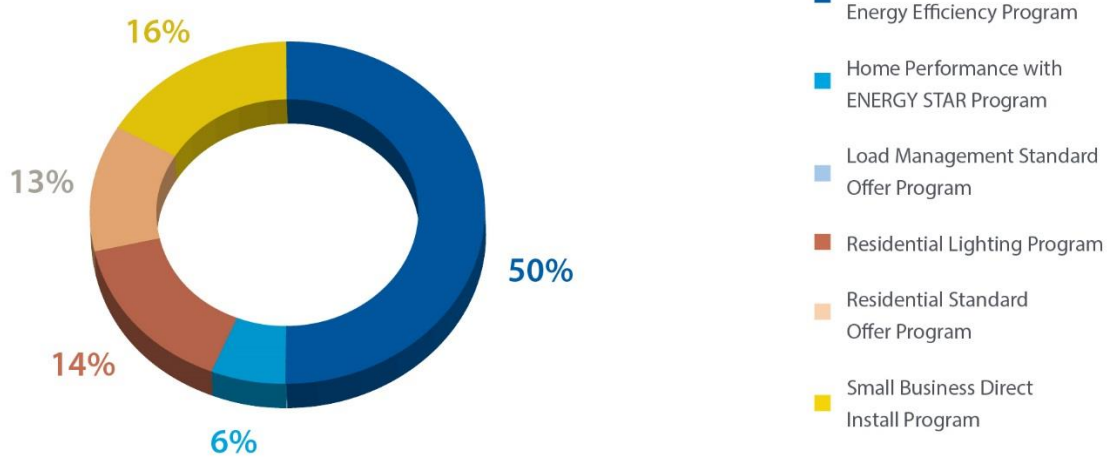
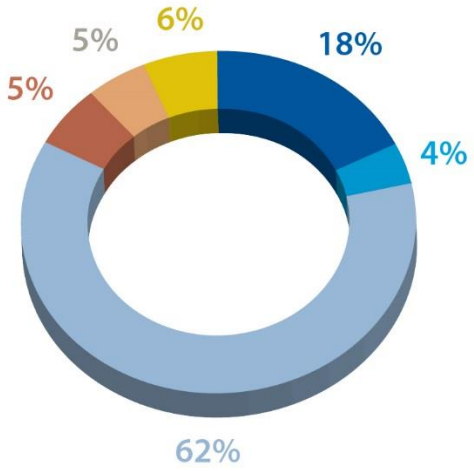
PORTFOLIO PERFORMANCE BY PROGRAM

Percentage of Savings per Program (MWh)



Percentage of Demand Reduction per Program (MW)



Note: These figures do not include programs that contributed less than 1% to the portfolio savings.

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KEY Goal Evaluated Percentage Achieved

COMMERCIAL AND INDUSTRIAL ENERGY EFFICIENCY PROGRAM

Energy Savings (MWh) 123%

12,750
15,687

Demand Reduction (kW) 127%

2,221
2,816

RESIDENTIAL LIGHTING PROGRAM

Energy Savings (MWh) 98%

4,410
4,336

Demand Reduction (kW) 387%

217
840

RESIDENTIAL STANDARD OFFER PROGRAM

Energy Savings (MWh) 140%

2,960
4,144

Demand Reduction (kW) 63%

1,286
816

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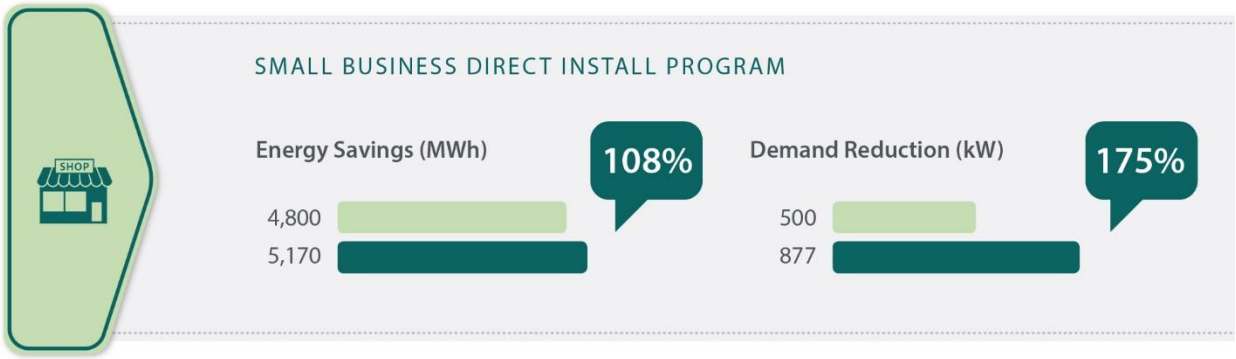

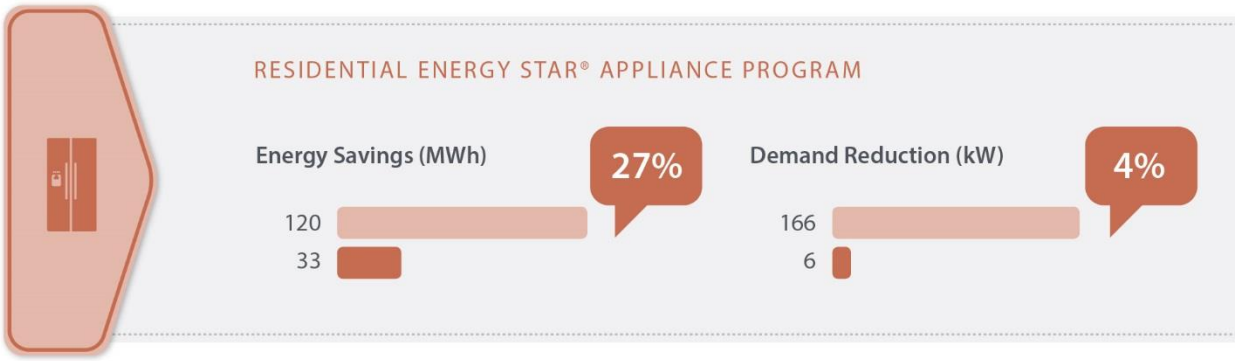

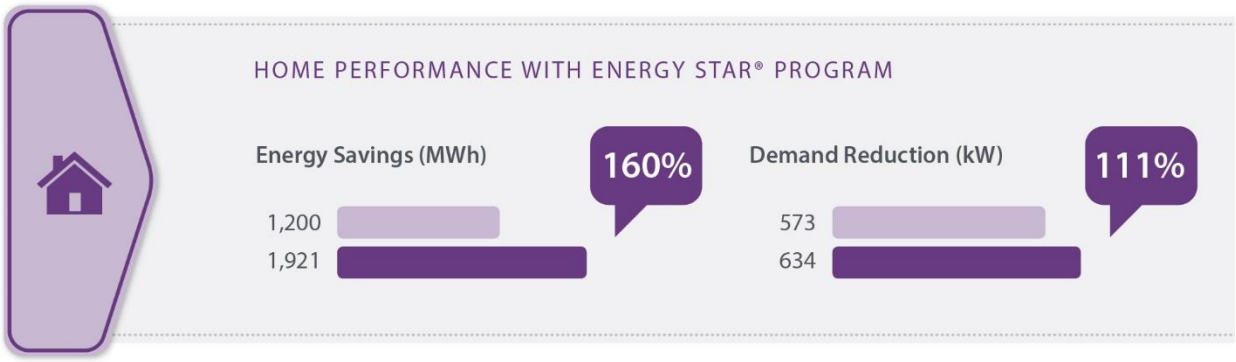

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Sample Recommendations

PORTFOLIO

- Develop a method in TRM 6.0 for adjusting lighting savings in the presence of existing lighting controls.
- The IEM should develop new estimates of energy savings based on Arkansas measurements of air infiltration for use in the TRM.
- Develop heating demand reductions for Commercial Door Air Infiltration.
- Develop deemed savings for Novelty Cooler Shutoff in the TRM.
- Update the algorithms in TRM 5.0 for AOH and CF in manufacturing buildings.

COMMERCIAL AND INDUSTRIAL ENERGY EFFICIENCY PROGRAM

- Ensure the maximum power value from the air compressor's CAGI data sheet is applied rather than the air compressor's nominal power.

RESIDENTIAL LIGHTING PROGRAM

- Consider increasing the number of online promotions and offerings for different products at different times throughout the year.
- For clothes washer measures, collect information about whether incentivized units are top or front loading.

RESIDENTIAL STANDARD OFFER PROGRAM

- Assess the impact of the statewide weatherization program on the RSOP/REIP in developing program budgets and targets for the 2017-2019 Energy Efficiency Plan. Going forward, be prepared to adjust targets, add measures or services, or increase participation if needed to retain a consistent level of savings.
- Consider the interactive effects between large measures being implemented in the same home. This may result in an adjustment to TRM calculations.
- Consider conducting a full process evaluation in 2016. Having gone through several program changes since the last comprehensive evaluation, RSOP/REIP would benefit from capturing customer and contractor feedback.

SMALL BUSINESS DIRECT INSTALL PROGRAM

- Identify specific business types that are well-suited for particular non-lighting measures, then market these measures along with lighting measures.

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LOAD MANAGEMENT STANDARD OFFER PROGRAM

- Consider a change to the demand threshold in the 2017-2019 Energy Efficiency Plan to enhance existing participation and recruit more customers in the 2017 program year. Alternatively, consider lowering the demand reduction goal.
- Identify customers who may have difficulty with the curtailment requirements early in the program year (e.g., following a test event) and provide technical support in advance of the first event.

RESIDENTIAL ENERGY STAR® APPLIANCE PROGRAM

- For the clothes washer measures, which will continue to be offered under the re-designed Residential Lighting and Appliances Program in 2016, have the implementer collect information about whether incentivized units are top or front loading.

HOME PERFORMANCE WITH ENERGY STAR® PROGRAM

- Update the TRM 5.0 calculations for ceiling insulation, air conditioning, and heat pump measures.
- Record water heater location in the tracking data.
- Use weather data from Rogers to calculate energy savings for weather-sensitive measures in climate zone 9.

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Introduction

In June 2011, the Arkansas Public Service Commission (APSC) approved Southwestern Electric Power Company's (SWEPCO) three-year Energy Efficiency Plan (Plan), covering program years 2011 through 2013. SWEPCO filed the plan in compliance with Order No. 7 in Docket No. 07-082-TF, which required investor-owned utilities in Arkansas to capture energy savings equivalent to 0.75% of their 2010 energy sales. After adopting a one-year extension of the Arkansas Energy Efficiency Plan filing in February 2014 (in Order No. 15 in Docket No. 13-002-U), which continued the Arkansas utilities' Plan savings targets and budgetary guidelines for 2014, the APSC approved a second one-year extension of the Arkansas utilities' three-year energy efficiency plans (to June 1, 2016 and covering the years 2017 to 2019). In this Order, the Commission adopted recommendations by the Parties Working Collaboratively (PWC):

> "For PY 2015, the existing PY 2014 budgets and utility performance incentive structure would remain in place, but savings targets would increase to 0.90% of retail sales for electric utilities….(as directed in Order No. 7)."

The Order further states:

> "Utilities would continue, for PY 2015, to be able to shift up to 10% of any program budget to another without notice. The PWC also recommends reinstating the flexibility to increase overall EE portfolio budgets by up to 10% without formal notice in order to meet increased savings targets, provided that utilities reasonably anticipate that overall portfolios will remain cost-effective."

As in previous APSC rulings, the Arkansas utilities retain flexibility to make up to 10% adjustments to program budgets, and may adjust energy savings and demand reduction goals as appropriate within the modified budgets. Thus, SWEPCO's 2015 budgets and energy savings and demand reduction goals—reflecting allowable adjustments as described above—serve as the basis against which its portfolio of programs were evaluated in 2015.

SWEPCO's plan includes a cost-effective portfolio of energy efficiency, conservation, and peak load reduction programs designed to facilitate reductions in electricity and peak demand in every customer class.

In accordance with APSC Rules for Conservation and Energy Efficiency Programs (C&EE Rules), SWEPCO engaged The Cadmus Group (Cadmus) to conduct an evaluation, measurement, and verification (EM&V) of its portfolio. Cadmus' staff, collectively referred to as the Cadmus Team, evaluated each program within the SWEPCO portfolio, excluding the statewide programs. This report presents the results of that evaluation.[1]

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[1] The Cadmus Team did not evaluate two statewide programs included in the SWEPCO portfolio: the Arkansas Weatherization Program (AWP) and Energy Efficiency Arkansas (EEA).

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Portfolio Overview

SWEPCO's energy efficiency portfolio comprises seven programs that offer a comprehensive range of energy efficiency, demand reduction, and educational options for every customer sector. SWEPCO designed its programs to achieve the following objectives:

- 2015 energy-savings target of 24,273 net MWh[2] and demand reduction target of 14,963 net kW
- Significant energy-savings opportunities for all customers and market segments
- Broad ratepayer benefits[3]
- Seven factors associated with portfolio comprehensiveness[4]

Through its energy efficiency portfolio, SWEPCO also seeks to provide customers with easy program entry points, flexible options for saving energy, and ongoing support for participants who want to pursue deeper energy savings. Table 1 lists SWEPCO's programs and targeted customer segments.

Table 1. SWEPCO Programs by Sector

Program	Residential/ Multifamily	Small Business	C&I
Commercial and Industrial Energy Efficiency Program (CIEEP)	-	-	■
Residential Lighting Program (RLP)*	■	-	-
Residential Standard Offer Program (RSOP)	■	-	-
Small Business Direct Install (SBDI) Program	-	■	-
Load Management Standard Offer Program (LMSOP)	-	-	■
Residential ENERGY STAR® Appliance Program (RESAP)	■	-	-
Home Performance with ENERGY STAR (HPwES) Program	■	-	-

* Although the RLP is targeted to residential and the multifamily sectors, applicable measures may be available to customers in all sectors.

[2] Total savings goal represents 0.9% of SWEPCO's 2013 energy sales. It excludes savings for the AWP and EEA programs and includes a reduction from the goal to account for industrial customers that opted to self-direct.

[3] As defined by the APSC in the C&EE Rules, APSC Order No. 17 in Docket 08-144-U.

[4] Ibid.

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EM&V Approach

The 2015 EM&V activities drew on multiple data collection, review, and analysis techniques to achieve the EM&V objectives. The Cadmus Team designed these activities to capture economies-of-scale by capitalizing on similar tasks across multiple programs and/or customer sectors and reducing or eliminating resource-intensive tasks that were unlikely to add to findings from previous years' analysis. Because this evaluation represents a joint effort between SWEPCO and Entergy Arkansas Inc. (EAI), the Cadmus Team combined data collection activities, as appropriate, to maximize efficiency and inform any broadly applicable insights.

The following overview summarizes the methods and approaches Cadmus used to conduct the impact evaluation, calculate NTG ratios, and assess program processes for the 2015 evaluation. Appendix A provides a more detailed explanation of the Team's general 2015 EM&V methodology. Each program section provides specific details regarding the research we conducted for that program and unique aspects of that program's evaluation methods.

2014 EM&V Objectives

- Verify program tracking data and the correct use of the Arkansas Technical Reference Manual version 5.0 (TRM 5.0) to calculate savings.
- Estimate 2015 net energy and demand impacts at the measure, program, and portfolio levels.
- Track SWEPCO's progress in incorporating recommendations identified during the 2014 evaluation.
- Assess the SWEPCO portfolio's success in achieving the goals and objectives established in the APSC Comprehensiveness Factors Checklist.
- Identify key issues and areas of focus for the next generation of SWEPCO programs.
- Track performance trends such as customer awareness, satisfaction, comprehensiveness, and marketing effectiveness.
- Provide recommendations to help streamline program delivery and operations, improve customer satisfaction, enhance participation and energy savings, and achieve program goals.

Data Collection

To facilitate a thorough evaluation, the Team completed primary research and data collection activities in 2015, including 11 stakeholder discussions, 29 customer and trade ally surveys/interviews, and 15 site visits. Table 2 summarizes our research activities by program, including the achieved sample for each activity.

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Table 2. Data Collection Activities and Sample Sizes

Program	Utility Staff Interviews	Implementer Interviews	Trade Ally Interviews	Participant Surveys	Site Visits
CIEEP	1	1	-	24	15
RLP	1	1	-	-	-
RSOP	1	1	-	-	-
SBDI	1	1	5	-	-
LMSOP	1	N/A	-	-	-
RESAP	-	-	-	-	-
HPwES	1	1	-	-	-
Total	**6**	**5**	**5**	**24**	**15**

Impact Evaluation

The Cadmus Team used established, industry standard approaches to estimate energy savings and demand reductions at the measure, program, and portfolio levels. We followed all applicable measure and program-level guidelines and protocols from the TRM 5.0.

To evaluate program impacts, the Team adjusted program-reported gross savings using the results of our research, relying primarily on engineering desk reviews, TRM deemed savings calculations, and on-site verification and metering for applicable programs. To calculate deemed savings, we verified the appropriateness of savings algorithms and values from the TRM 5.0. Where sampling was used (for surveys and site visits), we designed the sampling plans to achieve a minimum ±10% precision of the gross realized savings estimate with 90% confidence.

For each program and measure category, the Cadmus Team estimated energy savings and demand reduction by applying a verified gross savings adjustment to program-reported savings. Table 3 lists the impact analysis activities Cadmus performed in evaluating SWEPCO's 2015 energy efficiency and demand response programs.

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Table 3. 2015 Impact Evaluation Tasks*

Program	Database and Document Review	Engineering Desk Review/Modeling Review	TRM Deemed Savings Calculation Review	On-Site Measure Verification	Load Data Analysis	Baseline Demand Estimation
CIEEP	■	-	■	■	-	-
RLP	■	-	■	-	-	-
RSOP	■	■	■	-	-	-
SBDI	■	■	■	-	-	
LMSOP	■	-	-	-	■	■
RESAP	■	-	■	-	-	-
HPwES	■	■	■	-	-	-

* The Cadmus Team used data from surveys and interviews, described in the Process Evaluation section, to support program process and impact evaluations.

Net-to-Gross Analysis

The Cadmus Team conducted rigorous data collection and analysis to support NTG calculations in 2012 and 2013. For the 2014 and 2015 evaluations, we relied on these previous efforts for several programs. Table 4 shows the NTG approach identified for each program based on our assessment of specific program needs and the availability of accurate, existing information. These data collection and analysis activities are in compliance with one of the five accepted approaches listed in the TRM 5.0, Protocol F. Detailed descriptions of each NTG methodology are provided in Appendix A.

Table 4. 2015 NTG Methodology by Program

Program	2014 Assigned Value	Stipulated Value	Literature Review	New NTG Calculation (Freeridership/Spillover)	
				Primary Data Collection	Demand Elasticity Model
CIEEP	-	-	-	■	-
RLP	-	-	-	-	■
RSOP	■	-	-	-	-
SBDI	■	-	-	-	-
LMSOP	-	■	-	-	-
RESAP	-	-	■	-	-
HPwES	■	-	-	-	-

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Applied 2014 Value

For programs targeted for condensed process evaluations and that underwent primary data collection for NTG in 2012 and 2013, the Cadmus Team blended the NTG ratios and calculated a weighted average value. We applied this value in 2014 and used this approach again in 2015 for the programs indicated.

Stipulated Value

As in prior years, the Cadmus Team applied a stipulated value of 1.0 to the LMSOP, as freeridership is not a meaningful concept in the delivery of demand response programs.

Literature Review

In accordance with TRM 5.0 Protocol F, the Cadmus Team applied a NTG value to the RESAP based on secondary research. This approach was consistent with the approach used in 2014. In 2015, we conducted an update to the 2014 literature review using more current values from similar programs operating in jurisdictions with similar market conditions to those in SWEPCO's territory. We calculated an average NTG value from seven similar programs for application to the RESAP.

New NTG Calculation

For the CIEEP and RLP, the Team conducted new analyses to calculate NTG using two different methodologies. Below are overviews of each approach. For full methodological detail, please refer to Appendix A and each specific program section.

Primary Data Collection (Freeridership/Spillover)

Cadmus conducted participant surveys for the CIEEP and used the collected self-reported data to inform freeridership and spillover calculations. The results of these analyses informed our calculation of NTG.

Econometric Demand Elasticity Model

The Cadmus Team conducted a demand elasticity modeling (DEM) to inform the RLP NTG.

Process Evaluation

The Cadmus Team followed established, industry standard methods and TRM 4.0[5] protocols to conduct process evaluations in accordance with the work scopes and levels of effort required for each program. To determine the appropriate evaluation level for each SWEPCO program, the Team compared each program's 2014 results to the TRM Protocol C. According to the requirements listed below, none of SWEPCO's programs required a full process evaluation in 2015.

[5] TRM 4.0 was the prevailing version at the time the Cadmus Team developed its EM&V Plan for 2015.

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Table 5. TRM 5.0 Protocol C Process Evaluation Criteria

Process Evaluation Required (Full)	Process Evaluation May Be Needed (Condensed)
• New or modified program or a program component that has not been previously evaluated • No process evaluation was performed during previous funding cycle	• Program impacts lower or slower than expected • Program not meeting informational/educational objectives • Program participation lower or slower than expected • Operational or management structure slow to ramp up or not meeting administrative needs • Program cost-effectiveness lower than expected • Participants report problems or low satisfaction • Program not producing intended market effects

We also reviewed findings from prior years' research and assessed the relative importance of each criterion under Protocol C to determine areas of special focus for the 2015 evaluation. This assessment led the Team to conclude that a condensed level of evaluation was appropriate for all programs.

Cost-Effectiveness Analysis

Cadmus analyzed the benefits and costs of SWEPCO's energy efficiency programs and the entire portfolio to determine cost-effectiveness. The Team used Cadmus' DSM Portfolio Pro[6] model to calculate the benefit/cost ratios for four perspectives based on methods described in the California Standard Practice Manual for assessing demand-side management (DSM) programs' cost-effectiveness. Please see Appendix G for more information on the approach and results of our analysis.

[6] DSM Portfolio Pro has been independently reviewed by various utilities, their consultants, and a number of regulatory bodies, including the Iowa Utility Board, the Public Service Commission of New York, the Colorado Public Utilities Commission, and the Nevada Public Utilities Commission.

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2015 Portfolio Performance

Findings

The Cadmus Team provides the following portfolio-level findings based on impact and process evaluation research and analysis across the portfolio.

Table 6 summarizes SWEPCO's energy saving and demand reduction goals and results, as measured at the meter on an evaluated net basis. At the portfolio level, SWEPCO exceeded its net energy-savings goal by 29% when adjusted for approved self-direct customers and increased overall savings by 5% compared to 2014. SWEPCO also exceeded its demand reduction goal for the first time since launching its programs, capturing 15.86 net MW, an increase of 17% over the 2014 results.

Table 6. SWEPCO 2015 Portfolio Performance Summary*

Program	Net Energy Savings (MWh)			Net Demand Reduction (kW)		
	Goal	*Ex Post*	Percentage of Goal	Goal	*Ex Post*	Percentage of Goal
CIEEP	12,750	15,687	123%	2,221	2,816	127%
RLP	4,410	4,336	98%	217	840	387%
RSOP	2,960	4,144	140%	1,286	816	63%
SBDI	4,800	5,170	108%	500	877	175%
LMSOP	200	127	63%	10,000	9,868	99%
RESAP	120	33	27%	166	6	4%
HPwES	1,200	1,921	160%	573	634	111%
Total	**26,440**	**31,418**	**119%**	**14,963**	**15,857**	**106%**
Total Adjusted for Self-Direct**	**24,273**	**31,418**	**129%**			

* Neither goals nor achieved savings reflect adjustments to energy and demand to account for line losses.

** Savings adjusted for self-direct reflects an adjustment from SWEPCO's approved saving targets to account for industrial customers who opted out of utility provided energy efficiency programs in 2015

Energy Savings Performance

HPwES performed the best of all programs when compared to goals, exceeding SWEPCO's net savings goals by 60%. CIEEP exceeded its energy savings goal for the first time, achieving 123%, which is up 48% from 2014, and the RSOP also exceeded its goal by 40%.

Only three SWEPCO programs—RLP, LMSOP, and RESAP—failed to achieve their energy savings goals; however, the savings trends associated with these programs were not unexpected due to the following reasons:

- The RLP missed its energy saving goal by only 2%; this was consistent with participation, which fell 8% below target in 2015. The Team found that freeridership associated with LED products sold through the program was higher than expected; the Team attributed this to a relatively low incentive rate, less aggressive promotional activity, and with consumer characteristics that tend to favor lower priced products. In other words, although the cost of LEDs has come down

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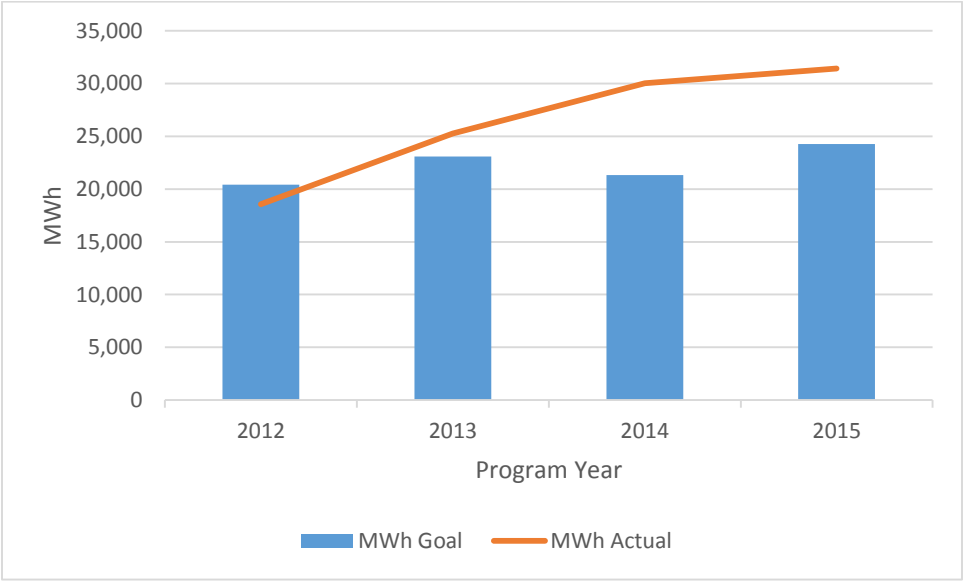
significantly in recent years, the price point is still considerably higher than that for CFLs, and Arkansas consumers are highly price sensitive. Because the incentive level did not bring the overall price of LEDs down to a level that was competitive with CFLs, we conclude that many customers who bought LEDs did so with intention and were not necessarily influenced to do so by the program discount.

- LMSOP is first and foremost a peak demand reduction program: its contributions to energy savings have never been significant.
- RESAP has struggled to make a significant contribution to SWEPCO's portfolio since inception. The challenges associated with this program have been well documented in prior evaluation reports. In 2016, SWEPCO plans to discontinue the program and offer select appliance rebates as part of a re-designed Residential Lighting and Appliances Program.

Regardless of these programs' shortfalls, the significant accomplishments by CIEEP, RSOP, and the HPwES Program helped enable the portfolio to exceed its goals. Figure 1 provides an overview of SWEPCO's portfolio-level energy savings performance since its first full program year in 2012. As shown, SWEPCO had its most successful program year to date in 2015, exceeding its energy savings goals by the largest margin ever (29%).

Figure 1. Annual Portfolio Energy Savings Targets Compared to Achievements, 2012-2015



As shown in Figure 2, CIEEP continued to account for the largest portion of energy savings (50%) in 2015, followed by SBDI (17%) and RLP (14%).

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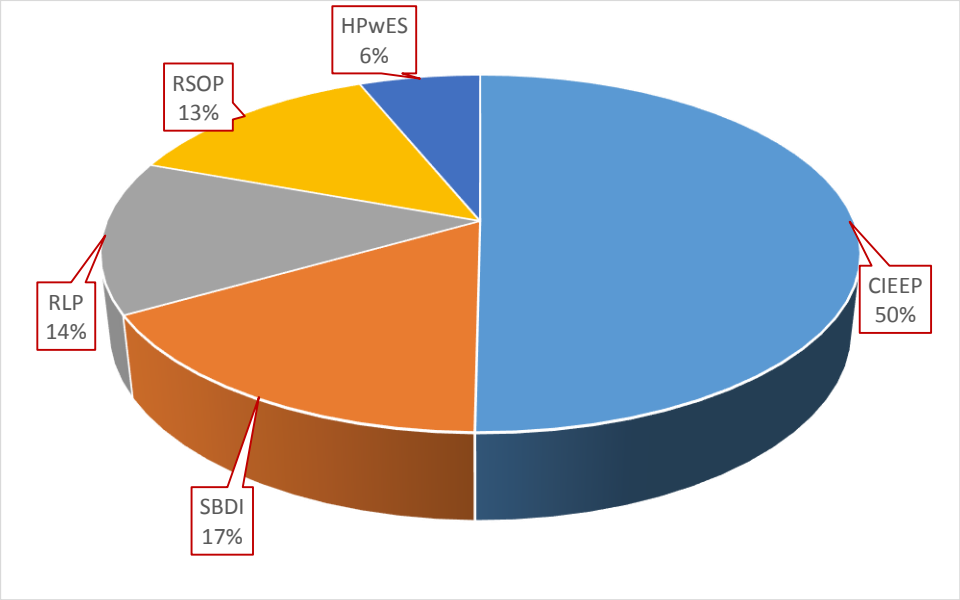
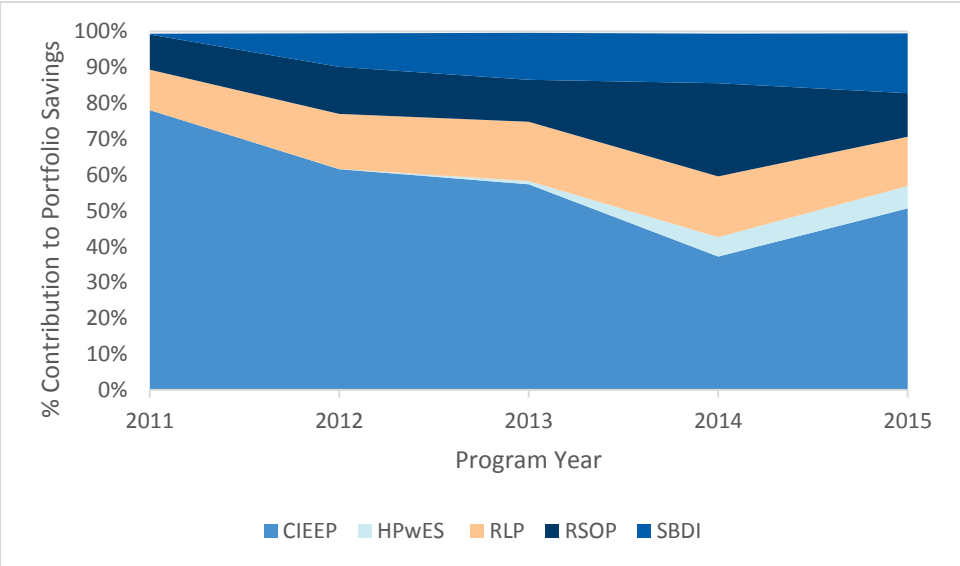
Figure 2. SWEPCO Net Energy Savings Distribution by Program



Note: RESAP and LMSOP, not shown in the figure, contributed less than 1% to the portfolio savings.

Figure 3 shows each program's contribution to portfolio net energy savings since 2011. Following a gradual three year decline, CIEEP savings increased by 40% in 2015 compared to 2014. This increase in savings corresponded to an increased contribution to overall portfolio savings in 2015, filling a gap left by the decline in RSOP savings compared to its extraordinarily successful year in 2014. The HPwES Program continued its growth trend in 2015, while SBDI and RLP remained relatively consistent.

Figure 3. Program Contributions to Portfolio Energy Saving, 2011-2015



Note: RESAP and LMSOP, not shown in the figure, contributed less than 1% to the portfolio savings.

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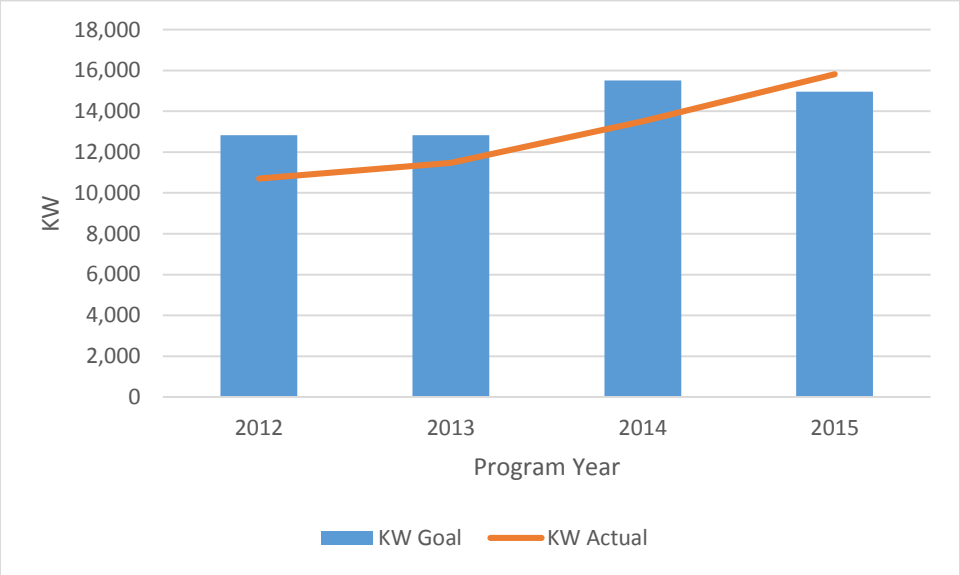
Demand Reduction Performance

Four of SWEPCO's seven programs exceeded their demand reduction targets in 2015. Although the RLP came just short of its energy saving goal, its individual demand reduction performance surpassed all other programs, exceeding its goal by 280% which is consistent with its performance in prior years.[7] The LMSOP, SWEPCO's primary demand reduction program, missed its performance target by only 1%. Of the two remaining programs to have missed their demand goals in 2015, one, RESAP, has struggled to achieve goals every year and will be discontinued in 2016, while the other, RSOP, has had a consistent trend of under-achieving its demand goals which is likely due to misaligned targets in SWEPCO's Energy Efficiency Plan.

Figure 4 provides an overview of SWEPCO's portfolio-level demand reduction results compared to its goals since its first full program year in 2012. As shown, SWEPCO exceeded demand reduction goal for the first time in 2015.

Figure 4. Annual Portfolio Demand Reduction Targets Compared to Achievements, 2012-2015



Consistent with prior years, LMSOP accounted for the majority (62%) of SWEPCO's portfolio demand reductions, while CIEEP produced the second largest portion of demand reductions (18%) in SWEPCO's 2015 portfolio.

[7] SWEPCO has exceeded its MW goals for the RLP every year by significant margins. As noted in prior EM&V reports, SWEPCO most likely underestimated the program's contribution to demand reduction when setting its MW goals.

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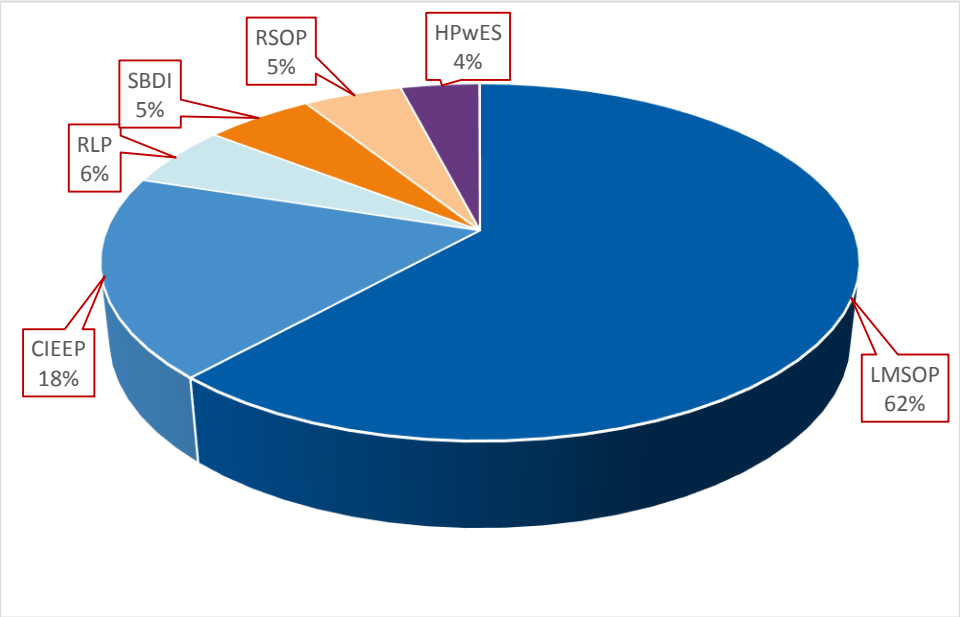
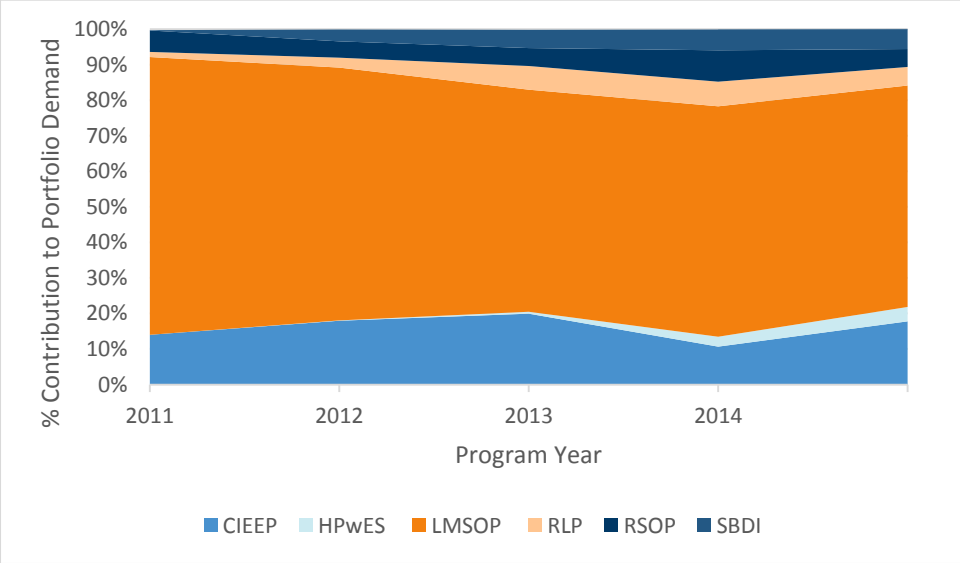
Figure 5. SWEPCO Demand Reduction Distributed by Program



Note: RESAP, not shown in the figure, contributed less than 1% to the portfolio demand reduction.

Not surprisingly, SWEPCO's load management program, LMSOP, has contributed the largest portion of demand reduction to its portfolio every year since 2011, while CIEEP consistently provides the second largest portion. The remaining programs, all focused on energy savings, provide nominal contributions.

Figure 6. Program Contributions to Portfolio Demand Reduction, 2011-2015



Note: RESAP, not shown in the figure, contributed less than 1% to the portfolio demand reduction.

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High Impact Measures

Figure 7 shows the relative net energy savings produced by commercial measures installed through SWEPCO's programs. The Lighting category accounted for an extraordinary 79% of the commercial energy savings in 2015. This is a return to the proportion in 2013 (74%) after a significant decrease to 52% in 2014, which had been driven by high plug load savings that year. The Motors category had the second highest impacts (6%), followed by the Custom category (5%).

Figure 7. High-Impact C&I Measures

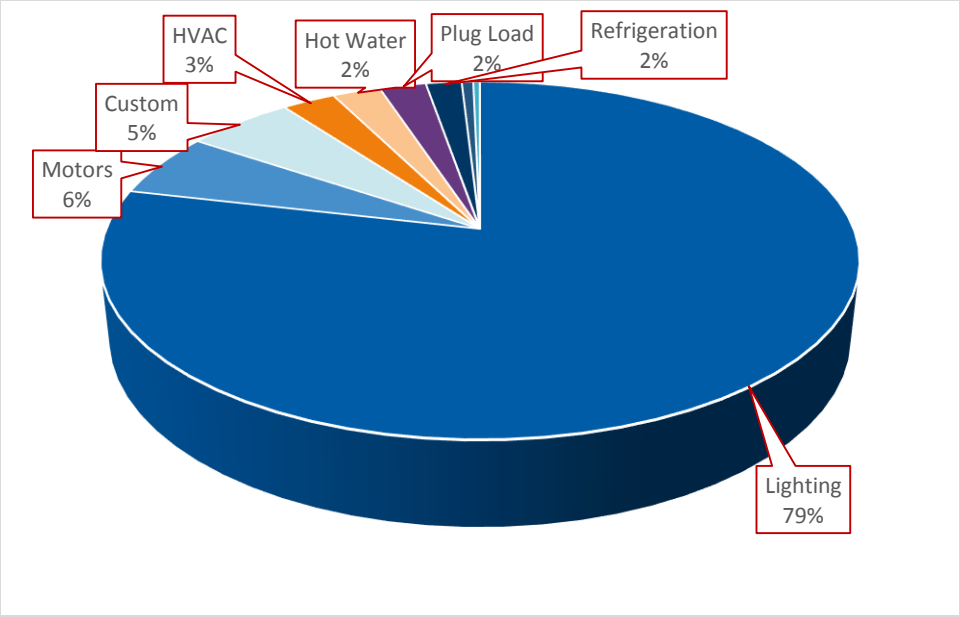

Figure 8 shows the relative net energy savings of residential measures installed through SWEPCO's programs. Lighting (48%) and HVAC (39%) had the highest impacts, followed by Envelope measures (11%). This distribution of savings across measure categories is reasonably consistent with 2014 performance, with a small increase in the proportion of savings attributed to lighting.

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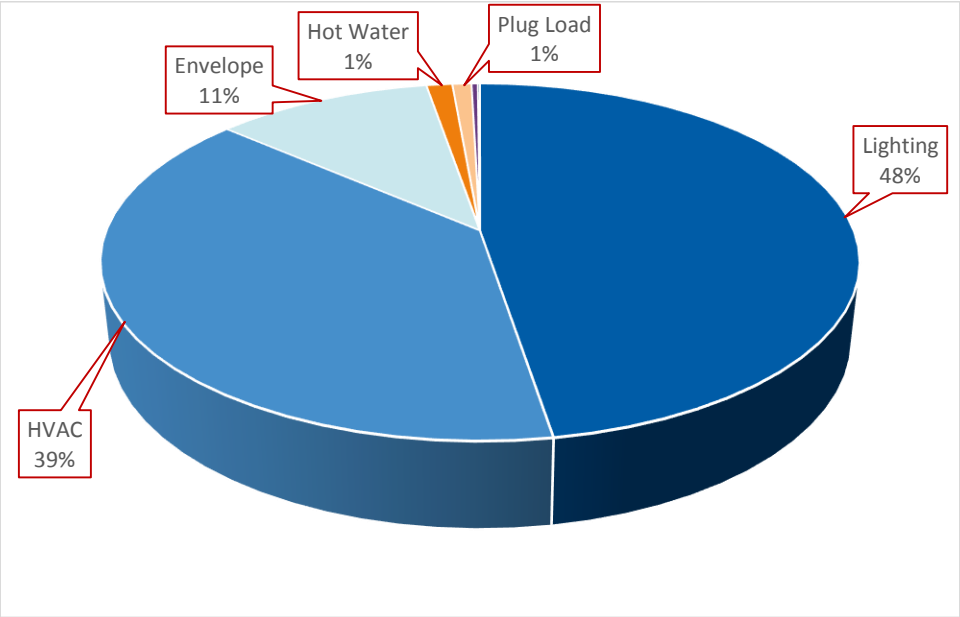
Figure 8. High-Impact Residential Measures



Comprehensiveness

In compliance with the APSC C&EE rules, the Cadmus Team assessed each of the seven factors described in the Comprehensiveness Checklist.[8] In 2012, the Team conducted an exhaustive evaluation to assess SWEPCO's overall compliance with the comprehensiveness factors, and found that SWEPCO generally performed well on comprehensiveness metrics. Similar to our approach in 2013 and 2014, in 2015 we re-assessed areas we had previously identified for potential improvements and documented new activities that had been implemented and that contributed to SWEPCO's overall comprehensiveness. A description of our 2015 comprehensiveness factors evaluation methodology is provided in Appendix A: Evaluation Methodology. Our findings relevant to each factor are outlined below.

Factor 1: Education, Training, Marketing, and Outreach

The Cadmus Team reviewed Factor 1 as three separate components: 1) education, 2) training, and 3) marketing and outreach. Each component is addressed below.

The Cadmus Team found that SWEPCO achieved the objectives of Factor 1 in 2015.

Comprehensiveness Factor 1

Whether the programs or portfolio provide, directly or through identification and coordination, the education, training, marketing, or outreach needed to address market barriers to the adoption of cost-effective energy efficiency measures

[8] APSC Order No. 17 in Docket No. 08-144-U

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Education

From 2011 to 2015, SWEPCO's programs consistently included activities and educational material for customers that conveyed the benefits of energy efficiency and ways to save energy in conjunction with standard marketing and outreach practices. New findings in 2015 include:

- For the CIEEP, SWEPCO incorporated energy efficiency tips into educational materials that are distributed by the implementer, trade ally manager, and energy advisors.
- For the RLP, the implementer encouraged retailers to provide direct education to customers and provided handouts to support the outreach.
- For the RSOP, the implementer took over call center responsibilities to provide better customer service and education about the program as well as about the benefits of energy efficiency.

Training

As in years past, the Cadmus Team found that in 2015, SWEPCO provided best practice training opportunities to its trade allies across nearly all programs. These trainings typically covered operational, technical, and customer-oriented topics. New topics in 2015 included:

- For RSOP, the implementer focused some of its four trainings on the customer experience to help sell projects with deeper savings and to build trust with customers.
- For RSOP, the implementer focused technical training topics on methods to overcome market barriers, such as calculating project payback and incentives, as well as marketing techniques to improve program awareness.
- For RESAP, the implementer provided customer-oriented training for program retailers on the new online rebate portal.

Similar to past years, SWEPCO collaborated with a variety of sponsors including implementers, community colleges, and others to facilitate, teach, host, and/or co-sponsor training events.

Marketing and Outreach

Because the goals and activities for marketing and outreach are frequently intertwined, the Cadmus Team assessed these two items jointly. SWEPCO kept its 2015 marketing and outreach activities consistent with previous years, with the most significant changes in strategy affecting the HPwES Program, RSOP, and RLP, as outlined below:

- For HPwES, SWEPCO made several changes to its website to improve customer access to information and contractor ease of use. For example, SWEPCO updated website content and made it more interactive, and reconfigured the search for a contractor function to sort by primary service offered. SWEPCO also developed an online contractor portal that included useful links.
- For RLP and RSOP, SWEPCO launched a joint online promotion by sending an email to customers announcing the availability of energy-efficient product kits. Within a few hours, the 500 promotional kits containing LEDs and advanced power strips sold out. The eligibility checks built into the ordering process, such as entering a ZIP code, allowed SWEPCO to minimize leakage.

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Factor 2: Budgetary, Management, and Program Delivery Resources

To evaluate budget and resource sufficiency, the Cadmus Team assessed performance indicators associated with the adequacy of budget allocations and the cost per kWh saved, and whether program staff and trade ally support was sufficient to support program goals.

> **Comprehensiveness Factor 2**
>
> Whether the program and/or portfolio have adequate budgetary, management, and program delivery resources to plan, design, implement, oversee, and evaluate energy efficiency programs

Cadmus determined that SWEPCO achieved the Factor 2 objectives.

Budgetary

Overall, SWEPCO exceed its portfolio energy-savings goals while spending 86% of the portfolio budget, up from 76% in 2014, indicating overall compliance with Factor 2. As shown in Table 7, at the program level, two of SWEPCO's programs exceeded their allocated budget by a small margin: RLP and SBDI. SBDI had energy savings on par with spending, slightly exceeding energy savings goals by 8% while exceeding budget by 4%. Three programs (CIEEP, RSOP, and HPwES) exceeded their energy-savings goals while slightly underspending their allocated budgets. CIEEP and HPwES also exceeded their demand reduction goals, as did RLP and SBDI. The CIEEP exceeded its savings goal for the first time, by 23%, while underspending budget by 12%, demonstrating program maturity and strong repeat participation.

Table 7. 2015 Budget Allocation and Program Goal Attainment

Program	Spending (Percentage of Budget)	Energy Savings (Percentage of Goal)	Demand Reduction (Percentage of Goal)	Cost per kWh*
CIEEP	88%	123%	127%	$0.24
RLP	105%	98%	387%	$0.14
RSOP	74%	140%	63%	$0.31
SBDI	104%	108%	175%	$0.22
LMSOP	83%	63%	99%	$2.24
RESAP	45%	27%	4%	$8.60
HPwES	95%	160%	111%	$0.58
Total	**86%**	**129%**	**106%**	**$0.27**

* The Team calculated the cost per kWh as total 2015 program spending divided by total achieved energy savings.

At a portfolio level, SWEPCO's acquisition cost (i.e., cost per kWh achieved) has been relatively stable since 2012. At a program level, HPwES had a pronounced, steady cost decline, as shown in Table 8. In 2012, HPwES had just two participants, which led to a program acquisition cost of $36.26 per kWh. By 2015, the cost was reduced to $0.58 per kWh. SWEPCO also reduced the acquisition cost of the SBDI Program by a small amount, from $0.26 per kWh in 2014 to $0.22 per kWh in 2015. The acquisition cost of the RESAP spiked to $8.60 per kWh in 2015, further supporting SWEPCO's decision to eliminate the program and offer select appliance rebates through a more cost-effective program such as the planned re-designed Residential Lighting and Appliances Program.

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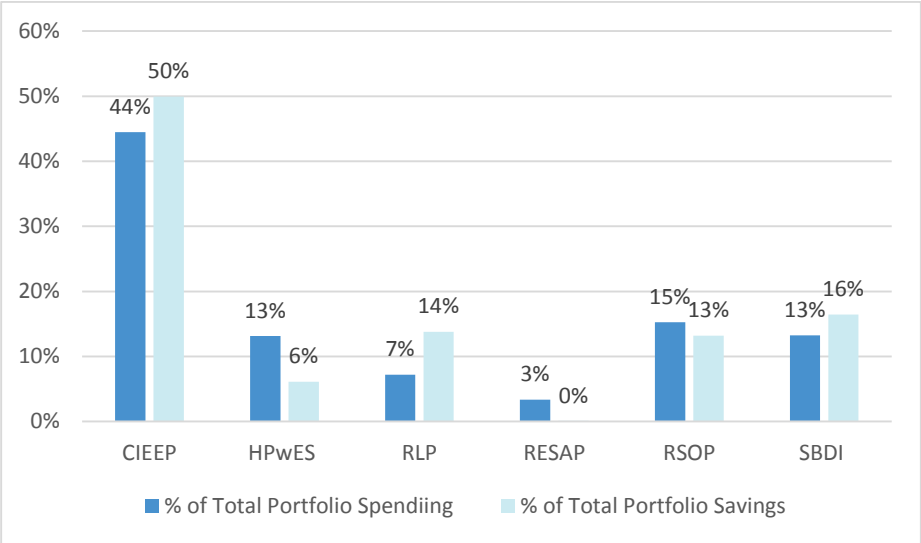
Table 8. Acquisition Cost by Program, 2012-2015

Program	Cost per kWh			
	2012	2013	2014	2015
CIEEP	$0.19	$0.18	$0.22	$0.24
RLP	$0.12	$0.12	$0.11	$0.14
RSOP	$0.53	$0.55	$0.21	$0.31
SBDI	$0.23	$0.24	$0.26	$0.22
RESAP	$3.88	$4.12	$5.24	$8.60
HPwES	$36.26	$1.67	$0.68	$0.58
Portfolio	**$0.27**	**$0.26**	**$0.25**	**$0.27**

Note: Because LMSOP is principally a demand reduction program, it is not included in this cost per kWh analysis.

Furthermore, SWEPCO's spending for the programs that contributed the most energy savings largely aligned with the per-program savings produced, as shown in Figure 9. For example, CIEEP accounted for 44% of the total portfolio spending and 50% of portfolio energy savings. None of SWEPCO's programs varied by more than 10% between the proportion of spending and savings contribution, and RESAP, RSOP, and SBDI varied by less than 5%. The RESAP contributed less than 1% to portfolio savings, and its portion of portfolio spending was also relatively small at 3%. The largest variance between program spending and savings occurred with HPwES and RLP, at 7% variance for each program. These findings are consistent with prior year results and are not unusual considering the relative costs versus savings impacts associated with those two programs.

Figure 9. Percentage of Portfolio Savings and Spending by Program



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Management and Delivery Resources

As the Cadmus Team has noted in past evaluations, SWEPCO's energy efficiency team has remained relatively stable since it initiated programs in 2011. This small team has maintained a successful portfolio of energy efficiency and demand reduction programs, and retained high customer and trade ally satisfaction. Consistency in the implementation contractors has also supported the continued growth of CIEEP, SBDI, HPwES, and RSOP.

Factor 3: Major End-Uses Addressed

To assess Comprehensiveness Factor 3, the Cadmus Team identified the end-uses addressed by each program. Since 2012, the Team has found that SWEPCO designed programs to offer customers a range of choices, focusing half the programs on capturing deeper energy savings through comprehensive projects. Encouraging comprehensive projects became a focal point for RSOP and HPwES in 2015, with HPwES achieving success in this area by obtaining 43% more savings per project than in 2014.

> **Comprehensiveness Factor 3**
>
> Whether the programs and/or portfolio reasonably address all major end-uses of electricity or natural gas, or electricity and natural gas, as appropriate

As was shown in Figure 7 and Figure 8, SWEPCO delivered a diversity of end-uses with its portfolio, thereby achieving the objectives of Factor 3.

While the contribution from lighting continues to dominate overall portfolio savings in both the residential and commercial sectors, program participants took advantage of an array of energy-efficient end uses, including motors, plug loads, HVAC, and hot water heating in the commercial sector and HVAC, building envelope, and water heating measures in the residential sector.

Table 9 lists the percentage of participants in each relevant program with multiple measure offerings who installed projects encompassing multiple end uses. Two of four programs (HPwES and the RSOP single family offering as well as Multifamily Direct Install Pathway) effectively encouraged the majority of participants to install measures covering multiple end uses. It is notable that all these programs target residential customers and offer several low-cost direct install measures covering multiple end uses. Although CIEEP and SBDI customers receive assessments and are encouraged to install multiple measures, these projects generally require greater capital investment, which is likely a barrier to installing multiple end-use projects. We note, however, that in 2014, 25% of CIEEP projects entailed multiple end uses compared to only 5% in 2015, a notable decrease in Factor 3 comprehensiveness for this program. The significant decrease in the cost of LED lighting, and subsequent customer interest in that technology likely impacted the uptake of lighting projects in 2015.

Note that because SWEPCO targets single measures with the RLP and the RESAP, and because the LMSOP is not an energy efficiency program, these were not included in our analysis of Factor 3.

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Table 9. Installation of Multiple End-Use Projects

Program	Percentage of Installations	
	Single End-Use Projects	Multiple End-Use Projects
CIEEP	95%	5%
RSOP, single family component	37%	63%
RSOP, Multifamily Direct Install Pathway	19%	81%
SBDI	94%	6%
HPwES	2%	98%

Factor 4: Comprehensively Address Customer Needs

In assessing Factor 4, the Cadmus Team reviewed the extent to which SWEPCO offers technical support to educate customers on cost-effective, comprehensive projects and/or whether it provides incentives that encourage participants to install multiple measures and/or those with higher efficiency levels that increase project comprehensiveness.

Comprehensiveness Factor 4

Whether the programs and/or portfolio, to the maximum extent reasonable, comprehensively address the needs of customers at one time, in order to avoid cream-skimming and lost opportunities

The Team determined that SWEPCO met the Factor 4 objectives, as it has in all prior years.

SWEPCO's portfolio offers customers the flexibility to participate through single measure installations or a comprehensive suite of upgrades. For the programs that offer multiple measure options, SWEPCO uses incentive structures designed to encourage comprehensive upgrades. In 2015, SWEPCO added an AC tune-up option as an additional service for its SBDI customers.

In all of the programs listed in Table 10, SWEPCO provides home or building efficiency assessments or surveys that result in recommendations for comprehensive home or facility energy efficiency upgrades. Through three of the four programs, SWEPCO also provides a diverse mix of direct installation measures to customers at no or low cost. For two of these four programs, the majority of participants installed multiple measures. Both business programs had a decline in the percentage of multiple measure projects compared to 2014; SBDI decreasing from 15% to 9% and CIEEP decreasing from 64% to 24%.

Note that because SWEPCO targets single measures with the RLP and the RESAP, and because the LMSOP is not an energy efficiency program, these were not applicable to our analysis of Factor 4.

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Table 10. Installation of Multi-Measure Projects

Program	Diverse Direct Install Measure Offered	Percentage of Installations	
		Single-Measure Projects	Multiple Measure Projects
CIEEP	No	76%	24%
RSOP, single family component	Yes	36%	64%
RSOP, Multifamily Direct Install Pathway	Yes	19%	81%
SBDI	Yes	91%	9%
HPwES	Yes	2%	98%

Factor 5: Targeting and Leverage

The Cadmus Team assessed Factor 5 by inspecting SWEPCO's portfolio for provisions of diverse energy efficiency opportunities to every key customer sector. The Team also assessed SWEPCO's use of external resources to promote the programs, train customers or stakeholders, and/or improve customers' project returns.

> **Comprehensiveness Factor 5**
>
> Whether such programs take advantage of opportunities to address the comprehensive needs of targeted customer sectors or to leverage non-utility program resources

Consistent with its performance in prior years, Cadmus found that SWEPCO's continued efforts contributed to again achieving the objectives of Factor 5 in 2015.

Since 2012, SWEPCO has implemented new activities aimed at meeting the specific needs of targeted customer sectors. For example, in 2015, SWEPCO targeted certain small business sectors as potential participants in the SBDI Program AC tune-up offering and also enhanced efforts to reach business customers in more rural parts of the service territory. In 2015, SWEPCO also implemented an HPwES Program contractor incentive to encourage trade allies to promote and install projects that deliver deeper savings; this proved very successful, as the average energy savings per home increased by 43%.

The Team also reviewed SWEPCO's use of external partnerships and resources to promote programs, leverage funding, implement assistance offerings, and create economies-of-scale to improve program effectiveness. Throughout all program years, SWEPCO has been a strong and consistent proponent of collaboration. For example, similar to past years, SWEPCO collaborated with a variety of sponsors including implementers, community colleges, and others to facilitate, teach, host, and/or co-sponsor training events in 2015.

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Factor 6: Cost-Effectiveness

To evaluate Factor 6, the Cadmus Team assessed whether programs achieved their Plan goals, NTG results by program, and program cost-effectiveness.

For each of these metrics, SWEPCO achieved the objectives of Comprehensiveness Factor 6 in 2015.

> **Comprehensiveness Factor 6**
>
> Whether the programs and/or portfolio enable the delivery of all achievable, cost-effective energy efficiency within a reasonable period of time and maximize net benefits to customers and the utility system

Goal Achievement

As discussed previously, four of SWEPCO's seven 2015 efficiency programs achieved their energy-savings goals, and four achieved their demand reduction goals. The 2015 energy-savings result is an increase over 2014 results, when only three programs achieved energy-savings targets and one achieved the targeted demand reduction.

NTG

For the majority of programs in 2015, Cadmus did not conduct new primary research to calculate NTG. However, in prior years, the majority of SWEPCO's programs had NTG ratios of 90% or greater, indicating that freeridership is not a significant issue for most programs. High freeridership rates are limited to specific measures—primarily lighting and appliances—which is consistent with results across the country. The programs that offer these measures, RLP and RESAP, have been significantly affected by factors such as widespread market adoption and low incremental costs that tend to drive up freeridership rates. For these programs, and especially for CFLs offered through the RLP, the necessity for utility incentive programs to stimulate broad consumer uptake may be waning. SWEPCO will eliminate the effect of high freeridership associated with many appliance measures, such as refrigerators, when it discontinues the RESAP in 2016.

Cost-Effectiveness

The Cadmus Team analyzed the cost-effectiveness of each 2015 program, including the two that were evaluated by other evaluation teams,[9] and including SWEPCO's online energy audit tool, Apogee, which does not produce energy savings or demand reduction. We analyzed the entire portfolio from each of the four test perspectives; our analysis methods and findings are described in detail in Appendix G.

SWEPCO's 2015 portfolio and its programs, with the exception of RESAP, were cost-effective from a total resource cost (TRC) perspective and from the utility's perspective (program administrator cost [PAC]) in 2015 (a benefit/cost ratio of 1.0 or greater is considered cost-effective). Additionally, all programs were cost-effective from the participant's perspective (participant cost test [PCT]), all with benefit/cost ratio results above 1.7. Both the RLP's and RSOP's benefits exceeded their costs by a factor of 5 or more and the LMSOP's benefits exceeded costs by a factor of more than 20.

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[9] The AWP and EEA are implemented statewide and evaluated under separate EM&V contracts from those included in this report.

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Table 11. Cost-Effectiveness Results by Program

Program	Savings Goal Achieved	Benefit/Cost Ratio Results			
		TRC	PAC	RIM	PCT
CIEEP	Yes	2.46	3.33	0.83	3.05
RLP	No	4.37	3.38	0.60	6.92
RSOP	Yes	2.60	2.99	0.55	5.63
SBDI	Yes	3.13	3.14	0.80	N/A**
LMSOP	No	22.99	5.35	5.19	20.76
RESAP	No	0.12	0.10	0.08	1.84
HPwES	Yes	1.26	2.10	0.69	1.72
Portfolio	**Yes**	**2.49**	**3.00**	**0.76**	**4.01**

** Because this is a direct install program and participant costs are very small compared to benefits, the resulting benefit/cost ratio is not meaningful.

Table 12 provides an overview of SWEPCO's portfolio levelized cost per kWh, costs, benefits, net benefits, and benefit/cost ratio from the four cost-effectiveness perspectives. SWEPCO's 2015 portfolio was cost-effective from all perspectives except the ratepayer impact (RIM)[10] test. The PAC and PCT results are particularly relevant to Comprehensiveness Factor 6, as these test results indicate that portfolio benefits exceeded its costs from the utility and customers' perspectives, respectively.

Table 12. Portfolio Cost-Effectiveness

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource Cost (TRC)	$0.036	$10,914,353	$27,209,526	$16,295,173	2.49
Program Administrator Cost (PAC)	$0.028	$8,651,744	$25,954,944	$17,303,200	3.00
Ratepayer Impact (RIM)	N/A	$34,185,570	$25,954,944	($8,230,625)	0.76
Participant Cost (PCT)	N/A	$7,127,803	$28,553,679	$21,425,877	4.01

[10] The RIM test measures the impact of programs and portfolios on customer rates. Many programs do not pass the RIM test because a utility's avoided energy savings are usually less than the lost revenues and operating costs of the program. When this happens, program nonparticipants are paying for benefits accrued by the participants through higher rates. The RIM test only passes if rates for nonparticipants will go down as a result of the program or portfolio, and this usually only happens for programs that target the highest marginal cost hours (when marginal costs are greater than rates).

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Factor 7: EM&V Procedures

To assess Factor 7, the Cadmus Team reviewed whether the EM&V Plan conformed to TRM 5.0 and achieved independent evaluation monitor (IEM) approval, whether the EM&V implementation followed an articulated EM&V plan, and the extent to which SWEPCO provided high quality and timely data and other support necessary to conduct EM&V.

> **Comprehensiveness Factor 7**
>
> Whether the programs and/or portfolio have EM&V procedures adequate to support program management and improvement; calculation of energy, demand, and revenue impacts; and resource planning decisions

Below we summarize the 2015 EM&V procedures' compliance with each of these evaluation metrics.

Conformance to TRM 5.0

The Cadmus Team drew extensively on the TRM 5.0 to calculate deemed savings. However, we deviated from specific TRM 5.0 guidelines in the few instances where tracking data did not provide information needed to apply TRM 5.0 algorithms. Our analysis of four programs deviated from the TRM:

- For HPwES, the equation in TRM 5.0 for heat pump replacement energy savings has an incorrect conversion factor. We corrected the equation prior to calculating savings, which resulted in higher energy savings for that measure.
- For the RESAP, we used the TRM 4.0 algorithm to estimate clothes washer savings because the TRM 5.0 algorithm requires information about the unit configuration (i.e., whether it is a top or front loading unit), which was not gathered in 2015.
- For the RSOP, we used the TRM 4.0 algorithm to estimate savings for central AC replacement. The implementer also used TRM 4.0 to estimate *ex ante* savings. The current federal minimum standard became effective January 1, 2015. Since the effective date is before July 1, the enforcement date is the end of the current program year (after December 31, 2015) and does not impact 2015 savings.
- For the RSOP and HPwES, TRM 5.0 provides look-up tables for many variables used in the calculation of duct sealing savings. The HDD table includes two different values for weather zone 9. Both the implementer and Cadmus used an average of the two values for application to units within weather zone 9.

EM&V Plan Approval by IEM

The Cadmus Team prepared a comprehensive EM&V Plan for 2015 and submitted it to SWEPCO and the IEM for review. We received several comments from the IEM regarding areas for refinement or additional detail. In most cases, the IEM requested greater detail in the description of EM&V activities, and wherever possible, the Team addressed these areas in the monthly status reports as well as in this report.

EM&V Plan Deviations

The Cadmus Team did not deviate from the EM&V plan submitted to SWEPCO and the IEM.

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SWEPCO Data

The Team conducted a mid-year data review in an effort to help prevent data issues from occurring in the year-end reporting phase. Per Cadmus' request, SWEPCO submitted data via secure file transfer portal for rebates distributed from January 1 to July 1, 2015. The Cadmus Team reviewed the data for any errors or omissions, and identified missing data fields and suggested modifications to ensure we could calculate and report year-end energy savings efficiently and accurately. We presented our findings in a report delivered to SWEPCO and the IEM. In our year-end analysis, Cadmus found that SWEPCO had addressed the majority of these issues.

As discussed above, SWEPCO and its implementers were responsive to the Cadmus Team's data requests, and accessing data was straightforward and productive. Specific examples of collaboration provided by SWEPCO and its implementation contractors to support the EM&V process include:

- ***Site Visits.*** The Cadmus Team conducted 21 on-site verification visits for 24 CIEEP projects representing 34% of total program energy savings. SWEPCO provided significant support by notifying site verification participants and identifying the most appropriate contact at each site. During these visits, the Team confirmed that all measures were installed and operational.
- ***Data Transfer and Data Quality.*** The Cadmus Team worked directly with utility and implementer staff to obtain the requested tracking data for the evaluation. The Team benefitted from this approach by obtaining exactly the data fields we needed, and the data remained consistent between extracts. SWEPCO and its implementer provided additional data upon request in a timely manner, transferring all data securely and in a format that complied with the Team's data security protocols.

Technical Reference Manual

The Cadmus Team has metered manufacturing lighting projects over four years.[11] In 2014, Cadmus concluded that both the annual hours of operation (AOH) and coincident factor (CF) values in the TRM are too high. Although the TRM values fell outside the 90% error bounds of the estimates, we agreed that the relatively small sample size and the degree of variability in the measured values rendered them sufficiently vulnerable to bias, such that additional data collection was warranted.

Having completed a fourth year of light metering research in manufacturing locations, the Team concludes once again that the AOH and CF values in TRM 5.0 fall outside the likely error bounds of our estimate.

- Our measurements indicate that 4,568 AOH is a more accurate value for manufacturing buildings in comparison to 5,740 AOH in TRM 5.0[12]

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[11] For this analysis, the Team pooled commercial metering data from site visits conducted in both SWEPCO and EAI territories in 2012, 2013, 2014, and 2015.

[12] The 90% upper confidence limit for AOH, based on four years of metering at 30 sites with 149 meters, is 5,209.

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- Our research reveals that 0.63 CF is appropriate for manufacturing buildings, compared to 0.89 in TRM 5.0[13]

Consistent with guidance from the IEM, Cadmus applied measurements we had taken on-site to the calculation of impacts for only those specific projects where measurements had been taken, and applied TRM values for the remaining project population. In any case, the TRM 5.0 values are too high for the manufacturing sites in Arkansas that participate in large C&I programs and should be revised.

Participation

As shown in Table 13, three of SWEPCO's seven programs are trending up in participation (RLP, SBDI, and HPwES). The most dramatic increase in participation has occurred in the HPwES Program, which experienced year-over-year participation increases from 2012 to 2014 of over 1,000%. As the program has matured, its participation increase between 2014 and 2015 was still an impressive 251%. Alternatively, the RSOP has had significant declines in measure installation since 2012, dropping from more than 17,000 measures installed in 2014 to 10,686 in 2015, a decline of 38%. The program may be nearing saturation in the multifamily sector, and may have additional declines in the single family sector in 2016 due to the launch of the Consistent Weatherization Approach. .

SBDI and CIEEP had increases in installed projects in 2015, demonstrating a steady improvement in commercial sector uptake.

Table 13. Program Participation, 2011-2015

Program	2011	2012	2013	2014	2015
CIEEP (projects)	55	125	212	118	219
RLP (6 CFLs or 4 LEDs/customer)	8,364	19,920	28,176	41,459	43,157
RSOP (measures)	959	21,305	33,144	17,487	10,686
SBDI (projects)	3	55	222	253	283
LMSOP (meters)	8	14	9	20	19
RESAP (measures)	108	489	753	905	516
HPwES (measures)	N/A*	2	246	3,298	11,598

* SWEPCO did not launch HPwES until 2012.

[13] The 90% upper confidence limit for CF, based on four years of metering at 30 sites with 149 meters, is 0.72.

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2015 Portfolio Conclusions and Recommendations

SWEPCO's programs have matured, and both energy savings and demand reduction have increased each year. SWEPCO recognizes the importance of trade ally training and engagement in the success of its programs and diligently maintains its focus on this important program delivery channel. The addition of a HPwES contractor incentive for encouraging and installing more comprehensive projects was a significant step in engaging trade allies and had good results. More deliberate pipeline management, including the mentioned use of contractor incentives in 2015, further contributed to smoothing the flow of projects throughout the year for HPwES, SBDI, and RSOP, leading to more effective program resource management.

SWEPCO's programs are generally comprehensive and SWEPCO makes efforts each year to achieve deeper energy savings per project and to target customers who could benefit from its programs. In 2015, SWEPCO focused on increasing the depth of savings per home in its residential programs. The success with these efforts varied: HPwES successfully increased the per-home savings by 43%, while RSOP failed to achieve deeper savings per home, but did successfully increase average savings per measure installed. Program design may account for these differences, because HPwES is deliberately designed as a comprehensive, whole-home upgrade program while RSOP is prescriptive and can be used for individual equipment purchases.

Because Cadmus conducted condensed process evaluations for every program and did very little primary research in 2015, we do not have any strategic portfolio-level recommendations. We did, however, identify several areas of the TRM that warrant updates in version 6.0, described below.

Conclusion: TRM values for Manufacturing AOH and CF are not consistent with Arkansas-specific measurements taken over a four-year period.

Recommendation: We recommend that the IEM update the algorithms listed in TRM 5.0, Table 322 with the revised commercial lighting measure values outlined in Table 14. An alternative would be to treat all manufacturing lighting projects as custom projects, requiring capture of AOH and CF information.

Table 14. Recommended Updates to TRM Parameter Values

Parameter	TRM 5.0 Value	Recommended Value	Applicable Programs
AOH for Manufacturing Buildings	5,740	4,568	CIEEP, SBDI
CF for Manufacturing Buildings	0.89	0.63	CIEEP, SBDI

Conclusion: TRM 5.0 does not account for situations where there are existing lighting controls for commercial lighting retrofits: there is no method to adjust the baseline operating hours when installing efficient lighting.

Recommendation: Develop a method in TRM 6.0 for adjusting lighting savings in the presence of existing lighting controls.

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Conclusion: There is an error in equation 48, Section 2.1.8 of the TRM. The conversion factor stated as $(\frac{1kWh}{3{,}412\ BTU})$ should be $(\frac{1\ kWh}{1{,}000\ w})$.

Recommendation: Change the conversion factor in TRM 6.0 equation 48, Section 2.1.8 to $(\frac{1\ kWh}{1{,}000\ w})$

Conclusion: The TRM uses air infiltration rates as part of a model to estimate savings for insulation measures that are not consistent with measured values from program participants across Arkansas. Across climate zones, the TRM model used ACH50 values between 25.8 and 30.3; however, Arkansas measurements indicate a range between 16.5 and 18.4. These test values are more appropriate than those used in the model, since they are based on a large sample of homes in Arkansas.

Recommendation: The IEM should develop new estimates of energy savings based on Arkansas measurements of air infiltration for use in the TRM.

Conclusion: For heat pumps, there is no algorithm or guidance in the TRM to determine heating seasonal performance factor (HSPF).

Recommendation: Develop a method to account for the heating efficiency of heat pumps.

Conclusion: TRM 5.0 only defines demand reduction for pipe insulation installed inside conditioned spaces. However, demand reduction also applies to insulation installed inside an unconditioned crawlspace or basement, since even in the summer those spaces are significantly cooler than ambient.

Recommendation: Include a TambientMAX value appropriate for unconditioned spaces in Table 147 of the TRM.

Conclusion: TRM 5.0 deemed savings calculations for Commercial Showerheads (3.3.5) includes only five facility types. One facility type, '24-Hour Fitness Center,' has significantly higher deemed savings than the other four facility types. Energy savings may be either over- or under-stated for fitness centers that do not operate 24 hour per day.

Recommendation: Develop water usage rates for fitness centers that are open fewer daily hours.

Conclusion: For the calculation of duct sealing savings (2.1.11), TRM 5.0 includes two different values for weather zone 9 (Volume 2, Table 1 and in Appendix C). For weather-sensitive measures in zone 9, an average of the two values was used.

Recommendation: Establish a single HDD value for zone 9 for use where the city is unknown.

Conclusion: The TRM 5.0 deemed savings tables for Commercial Door Air Infiltration (3.2.11) do not include heating demand reductions.

Recommendation: Develop heating demand reductions for Commercial Door Air Infiltration.

Conclusion: TRM 5.0 does not include deemed savings for Novelty Cooler Shutoff.

Recommendation: Develop deemed savings for Novelty Cooler Shutoff in the TRM.

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Progress on Implementation of Previous Recommendations

To determine the status of each recommendation, the Cadmus Team gathered input from key stakeholders, including implementation and program staff; reviewed program materials and databases; and conducted trade ally interviews and customer surveys.

Status Definitions

Completed: SWEPCO considered and took action to implement the recommendation

In Progress/Partial: SWEPCO either partially implemented or is in the process of implementing the recommendation

Incomplete: SWECPO did not implement the recommendation

N/A: The recommendation is no longer applicable for the program

SWEPCO completed nearly all outstanding 2013 and 2014 evaluation recommendations. Table 15 lists the status of each outstanding 2013 program and portfolio-level recommendation that remained pending or incomplete as of December 2015, as well as all 2014 recommendations.

Table 15. Overall Status of 2013 and 2014 Recommendations

Program	Completed	In Progress/Partial	Incomplete	N/A	Total
Portfolio	2	2	2	0	**6**
CIEEP	0	0	0	0	**0**
RLP	1	0	0	0	**1**
RSOP	1	3	0	0	**4**
SBDI	1	3	0	0	**4**
LMSOP	2	0	1	0	**3**
RESAP	1	0	0	1	**2**
HPwES	2	0	0	0	**2**
Total	**10**	**8**	**3**	**1**	**22**

Table 16 summarizes the status of 2014 portfolio-level recommendations. The status column provides supporting documentation of the recommendation, but may not be exhaustive of the entire portfolio. We present similar results at a program level in each program-specific section.

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Table 16. Status of 2014 Portfolio-Level Recommendations

Year	Recommendation	2015 Status
2014	As SWEPCO prepares its analysis and plans for the next Energy Efficiency Plan filing with the APSC, the Team recommends considering several modifications to the residential portfolio: • Consider having HPwES as the primary program through which SWEPCO customers are eligible for weatherization measures. • Consider offering a limited multifamily specific program and offering measures currently available through the RSOP in a standalone prescriptive residential efficient products program. • Consider expanding RLP to include non-lighting measures and possibly midstream incentives. • Eliminate RESAP.	***In Progress/Partial.*** In 2016, SWEPCO will eliminate the RESAP and expand the RLP to include appliance measures, under a new program name: Residential Energy Incentive Program (REIP). SWEPCO may be considering additional modifications for its 2017-2019 Energy Efficiency Plan to be filed June 1, 2016.
2014	Update algorithms listed in TRM 4.0, Table 322 with the revised commercial lighting measure values outlined in Table 16 of the 2014 SWEPCO Evaluation Report.	***In Progress/Partial.*** Of the four recommended updates to parameter values, only the coincidence factor for Office Buildings was modified. However, the Team notes that TRM updates are outside SWEPCO's control.
2014	For TRM 5.0, simplify the guidelines on applying EISA rules and make them more consistent. Appendix E could be simplified and made more consistent with the rest of the TRM by specifying a watts/lamp and watts/fixture of 72 for any 100-watt incandescent lamps.	***Incomplete.*** Appendix E and guidelines on the application of EISA rules remained unchanged in the TRM 5.0. However, the Team notes that TRM updates are outside SWEPCO's control.
2014	For anti-sweat heater controls, the TRM 4.0 uses incorrect values. Update the TRM to include the savings values found in page 39 of the 2014 SWEPCO Evaluation Report.	***Completed:*** The TRM 5.0 contains the appropriate calculation.
2014	Remove 1-PAF from the demand reduction algorithm because it is irrelevant.	***Completed.*** The TRM 5.0 contains the appropriate algorithm.
2014	Update the TRM to include savings estimates from purchasing upstream lighting for commercial applications, as well as savings estimates from installing storage lamps.	***Incomplete.*** The TRM 5.0 does not include savings estimates related to upstream lighting commercial applications. However, the Team notes that TRM updates are outside SWEPCO's control.

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Commercial & Industrial Energy Efficiency Program

Program Overview

Through the CIEEP, SWEPCO provides optional walk-through assessments, project financial analysis, technical assistance in developing project specifications, and incentives to customers in existing or new facilities that install qualifying energy-efficient equipment. The eligible equipment includes high-efficiency lighting fixtures and lamps, air compressors, refrigeration, motors, fan pumps, VFDs, chillers, renewable energy systems (geothermal, solar thermal, solar photovoltaic, and wind), computer power management (CPM), demand control ventilation for commercial fan hoods, low-flow faucet aerators, and low-flow pre-rinse spray valves.

Customer Requirements

With the CIEEP, SWEPCO targets commercial customers in all sectors, including local governments and public facilities, with peak demand greater than 50 kW.

The incentive amount varies by the type of measures installed and the annual energy savings (kWh) and demand reduction (kW) resulting from the installed measures. SWEPCO program staff work directly with the largest customers, those with demand of 750 kW or greater, and the program implementer, CLEAResult, works with eligible customers with demand between 50 kW and 750 kW and supports program administration and marketing.

2015 Performance

In 2015, CIEEP exceeded its goals, achieving 123% and 127% of the energy savings and demand reduction targets, respectively, while only spending 88% of its budget. CIEEP delivered 40% more energy savings in 2015 than in 2014. Table 17 provides a summary of CIEEP accomplishments.

Table 17. CIEEP 2015 Goals vs. Actuals

	2015 Goal	2015 Actual	Percentage of Goal Achieved	2014-2015 Percentage Change*
Net Energy Savings (MWh)	12,750	15,687	123%	↑40%
Net Demand Reduction (kW)	2,221	2,816	127%	↑ 96%
Participation (projects)	220	236	107%	↑ 100%
Budget	$4,264,937	$3,769,377	88%	↑50%

* Change in actual achieved results and spending from 2014.

The CIEEP has produced the largest share of SWEPCO's portfolio energy savings every year since its portfolio launched. Although it has fallen short of its savings goals in prior program years, in 2015, the CIEEP exceeded its goal for the first time, and by a significant margin. Figure 19 represents the CIEEP annual energy savings goals and achievements from 2012 to 2015.

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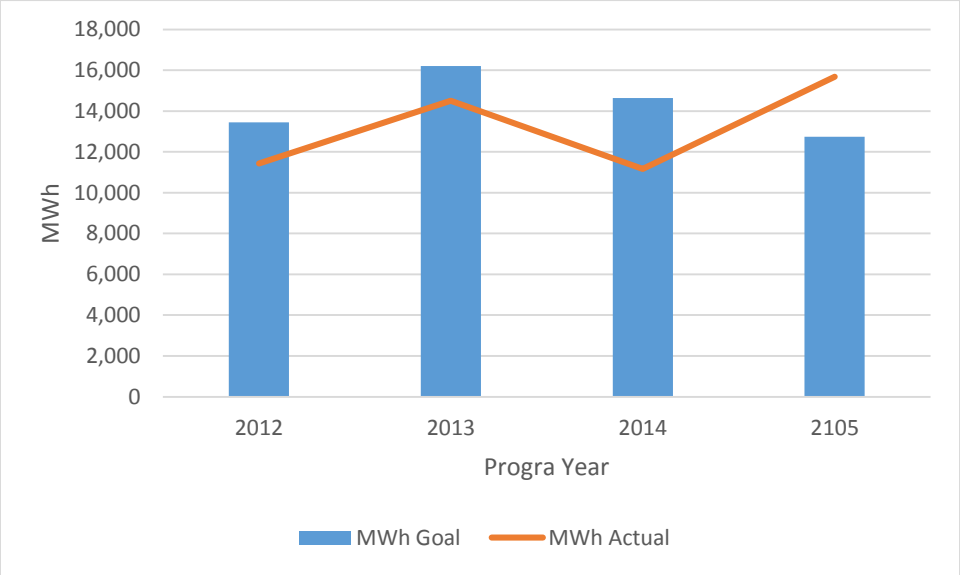
Figure 10. CIEEP Goals vs. Actual, 2012-2015



Cadmus attributes the CIEEP successes in 2015 to a variety of factors, including:

- Participation by repeat customers, especially those who had already completed lighting projects.
- Decreasing LED costs led to a high number of installations. Program staff reported that there was less diversity in the overall measure mix in 2015 due to the large number of lighting projects.
- Better understanding of program parameters and expectations among trade allies, who have become more active program advocates. The program implementer also reported that the number of active trade allies in the program increased.

These factors are discussed further in the Process Evaluation Results section below.

Approach

Table 18 lists the EM&V activities the Cadmus Team performed for the CIEEP in 2015.

Table 18. CIEEP Analysis Activities

Impact Evaluation	NTG	Condensed Process Evaluation
• Database and document review • TRM deemed savings calculation review • On-site verification	• Online self-report survey with participating customers (0.96)	• Year-end interviews - Utility Program Manager (n=1) - Implementer Program Manager (n=1) • Participant survey (n=24)

Below, we provide specific information regarding Cadmus' research and analyses that are unique to the CIEEP. Appendix A provides detailed descriptions of the Team's general research and analytical methods.

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Impact Evaluation Approach

Cadmus conducted an impact analysis in conformance with the guidelines provided in the TRM 5.0. Specific impact evaluation activities are described below.

Database and Document Review

To inform the 2015 impact and process evaluations, the Team reviewed the following materials:

- 2015 Program Manual
- 2015 marketing and promotion materials
- Monthly status reports
- Site-specific measurement and verification plans and reports on custom projects
- Project files, including invoices, calculations, and pre- and post-installation inspection reports
- Work papers on new calculation methods

TRM Deemed Savings Calculation Review

The Team verified the TRM 5.0 formulas and inputs for prescriptive measures implemented through the CIEEP to determine if they were reasonable. We compared changes between TRM 4.0 and TRM 5.0 values, and examined the validity of assumptions provided for each. We also reviewed program application forms and invoices to compare the reported versus installed quantity of measures.

On-Site Measurement and Verification

The Cadmus Team conducted site visits to assess 20 prescriptive and four custom projects at 21 sites, representing 34% of total program energy savings. The site visits involved on-site verification of measures for custom HVAC, compressed air, lighting, and a solar photovoltaic installation. Site visit reports associated with the four custom projects are provided in Appendix B.

NTG Evaluation Approach

Cadmus conducted primary data collection in the form of online participant surveys, which allowed us to estimate freeridership and spillover for calculating NTG. The Team fielded these surveys in October and November, 2015 using participant data through the third quarter of the program year. SWEPCO provided the team with a list of 124 projects, however a number of these were associated with the same individual contact names (often a contractor) and some were duplicate projects. After removing duplicates and those without email addresses, the sample of individual projects was 63. After fielding the online survey, Cadmus had captured completed responses from 24 individuals representing 31 projects, a 38% response rate.

We calculated net program savings by multiplying the NTG ratio determined from the equation below by the gross program savings.

$$NTG = 1 - Freeridership + Spillover$$

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The Team's methods for estimating freeridership and spillover are summarized below. Appendix A provides greater detail on our NTG calculation methods.

Freeridership Methods

The Cadmus Team estimated freeridership based on four general question categories: (1) prior plans for measure installation, (2) available budget, and (3) stated intent. Consistent with the guidelines for assigning freeridership in TRM 5.0, we categorized respondents as either full freeriders (100%) or non-freeriders (0%) based on their responses to a battery of questions aimed at determining the program influence on their decision to install high efficiency projects.

Spillover Methods

The Team relied on three general questions categories for measuring "like" and "non-like" program spillover: (1) installations of additional measures, (2) absence of incentives, and (3) program influence.

Cadmus combined this freeridership and spillover information with additional data we derived from surveys and interviews to develop the final NTG ratio.

Process Evaluation Approach

In accordance with TRM 4.0 Protocol C and the SWEPCO approved 2015 EM&V Plan, the Cadmus Team conducted a *condensed* process evaluation of the CIEEP in 2015. Although CIEEP did not achieve its participation goals 2012 through 2014, year-over-year trends show reasonable program growth (commensurate with expectations) during each year of delivery, and in 2015, the program achieved its goals. Additionally, because the program has remained consistent and SWEPCO has indicated no significant challenges or concerns with the program, the Team determined that a condensed process evaluation was appropriate for CIEEP.

Program Staff and Implementer Interviews

Cadmus conducted year-end interviews with the CIEEP utility and implementation managers. We focused these interviews primarily on the program performance for the year, activities to address previously identified recommendations, and plans for the program in SWEPCO's 2017-2019 program cycle.

Participant Survey

The Cadmus Team conducted an online survey with participating customers. Although the primary purpose of the survey was to collect data to inform a new NTG ratio, we also asked a limited number of qualitative questions to inform the process evaluation. The Team used Qualtrics, a web-based survey program, to contact customers using their email addresses. Customers who completed the survey were eligible for a gift card. The participant survey covered the following:

- Freeridership
- Spillover
- Satisfaction with SWEPCO

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Evaluation Findings

Impact Evaluation Results

The implementer successfully brought projects into the program, conducted M&V, and calculated the appropriate energy savings and demand reductions. The implementer's tracking data for prescriptive measures were usually appropriate for the specific measure type. However, as with any large, complex C&I incentive program, Cadmus identified several issues and discrepancies with data and calculation methods, particularly on the custom measures. These findings do not detract from the implementer's overall performance, but provide useful information to support further improvements to program design and implementation.

The following sections present the findings from each impact evaluation activity.

Database and Document Review

The Team reviewed the program tracking database extract and project files. In general, all of the documentation appeared reasonable.

TRM Deemed Savings Calculation Review

The Cadmus Team reviewed TRM deemed savings calculations and determined they were reasonable.

On-Site Verification and Metering

Cadmus conducted on-site verification of 24 projects (20 prescriptive and four custom). We also installed light loggers at nine sites to obtain more information on the facility's annual hours of operation. In general, the Team found implementation to be of good quality, and we approved many measures without adjustment. We did identify issues with some of these projects, often specific to a particular measure type. Below, we summarize those findings.

Compressed Air

Cadmus verified the largest custom compressed air project and a smaller project that relied on a prescriptive point-of-sale algorithm. The larger project involved installing three new 150-HP load/unload air compressors and adding a new cycling refrigerant dryer. These measures improved the overall compressed air system at the manufacturing facility. Cadmus determined that the measures had been installed and were operating as intended. The Team then determined annual energy use and peak demand using a daily bin analysis of the pre- and post-installation binned meter data provided by the implementer, as shown in Figure 11 and Figure 12. The Team accounted for savings from a flow rate reduction due to adding a cycling refrigerated air dryer, and calculated slightly higher savings than reported, resulting in a 102% realization rate.

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Figure 11. Baseline Daily Binned Meter Data

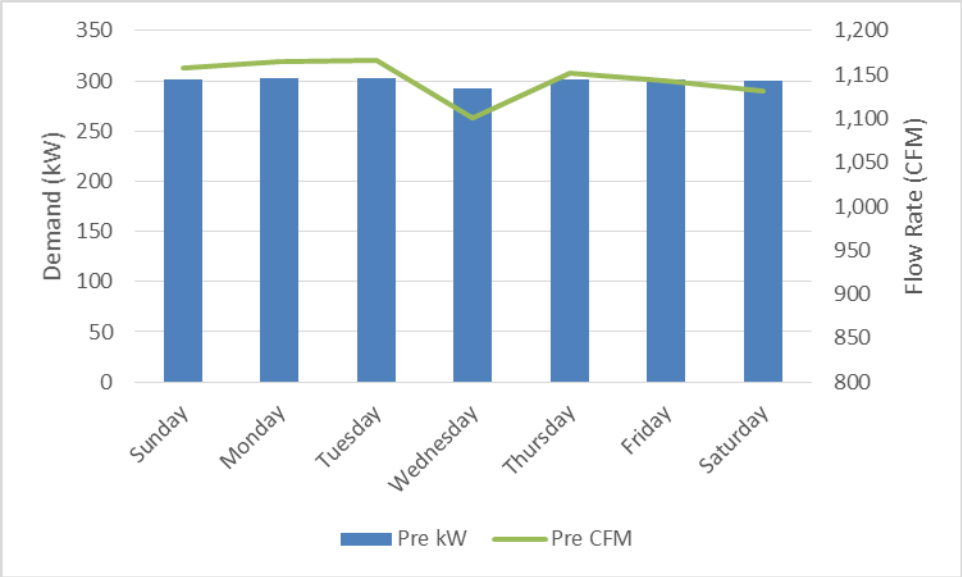
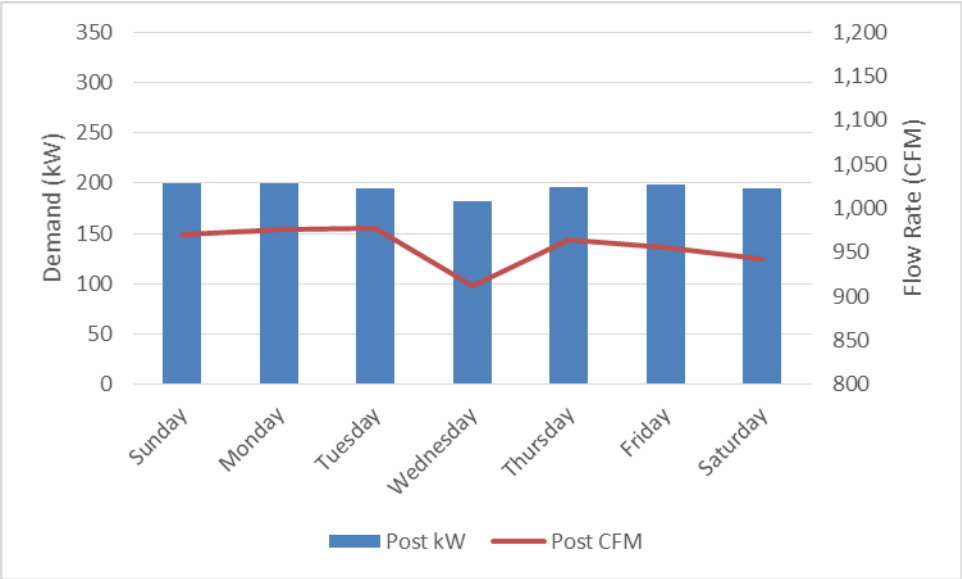


Figure 12. Retrofit Daily Binned Meter Data



The Cadmus Team found the implementer applied a deemed methodology in calculating savings for the smaller of the two sample compressed air projects that resulted in more conservative energy savings. The prescriptive algorithm in the implementer's most recent work paper on this measure uses the compressor's maximum input power to estimate energy savings. The implementer, based on an earlier work paper that Cadmus reviewed and approved, calculated maximum power of 59.39 kW based on the air compressor horsepower. The Cadmus Team obtained the Compressed Air and Gas Institute (CAGI) data sheet for the relevant air compressor, showing maximum power of 68.4 kW (see Figure 13). Using this value in the savings algorithm would have resulted in higher evaluated than reported savings.

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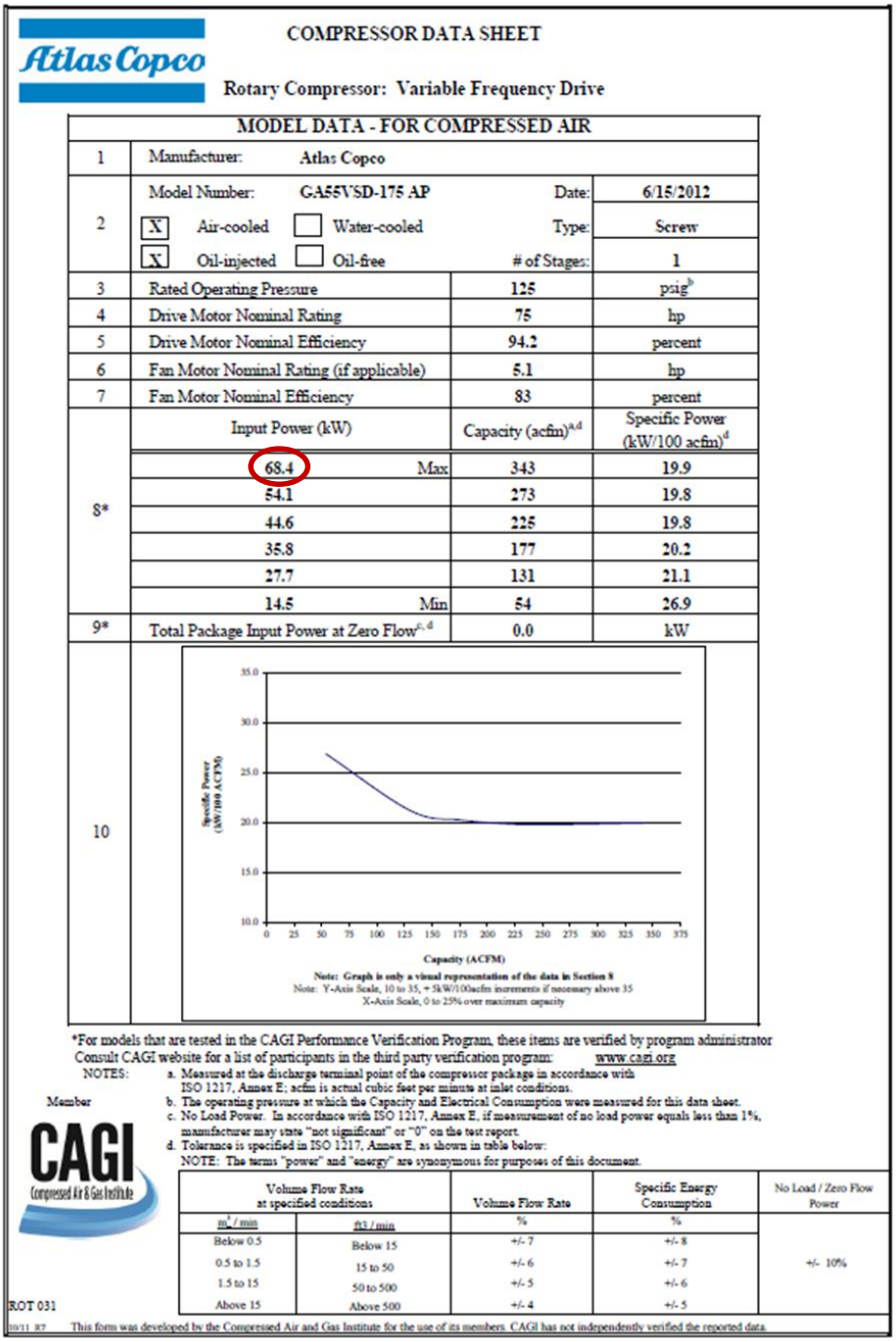
However, Cadmus accepted the implementer's reported savings based on the original, approved methodology.

Figure 13. Variable Frequency Drive CAGI Data Sheet



Atlas Copco

COMPRESSOR DATA SHEET

Rotary Compressor: Variable Frequency Drive

MODEL DATA - FOR COMPRESSED AIR			
1	Manufacturer: Atlas Copco		
2	Model Number: GA55VSD-175 AP	Date:	6/15/2012
	[X] Air-cooled [ ] Water-cooled	Type:	Screw
	[X] Oil-injected [ ] Oil-free	# of Stages:	1
3	Rated Operating Pressure	125	psig[b]
4	Drive Motor Nominal Rating	75	hp
5	Drive Motor Nominal Efficiency	94.2	percent
6	Fan Motor Nominal Rating (if applicable)	5.1	hp
7	Fan Motor Nominal Efficiency	83	percent
8*	Input Power (kW)	Capacity (acfm)[a,d]	Specific Power (kW/100 acfm)[d]
	68.4 Max	343	19.9
	54.1	273	19.8
	44.6	225	19.8
	35.8	177	20.2
	27.7	131	21.1
	14.5 Min	54	26.9
9*	Total Package Input Power at Zero Flow[c, d]	0.0	kW
10			

*For models that are tested in the CAGI Performance Verification Program, these items are verified by program administrator
Consult CAGI website for a list of participants in the third party verification program: www.cagi.org

NOTES:
a. Measured at the discharge terminal point of the compressor package in accordance with ISO 1217, Annex E; acfm is actual cubic feet per minute at inlet conditions.
b. The operating pressure at which the Capacity and Electrical Consumption were measured for this data sheet.
c. No Load Power. In accordance with ISO 1217, Annex E, if measurement of no load power equals less than 1%, manufacturer may state "not significant" or "0" on the test report.
d. Tolerance is specified in ISO 1217, Annex E, as shown in table below:
NOTE: The terms "power" and "energy" are synonymous for purposes of this document.

Member CAGI Compressed Air & Gas Institute

Volume Flow Rate at specified conditions		Volume Flow Rate	Specific Energy Consumption	No Load / Zero Flow Power
m^3 / min	ft3 / min	%	%	
Below 0.5	Below 15	+/- 7	+/- 8	+/- 10%
0.5 to 1.5	15 to 50	+/- 6	+/- 7	
1.5 to 15	50 to 500	+/- 5	+/- 6	
Above 15	Above 500	+/- 4	+/- 5	

ROT 031
10/11 R7 This form was developed by the Compressed Air and Gas Institute for the use of its members. CAGI has not independently verified the reported data.

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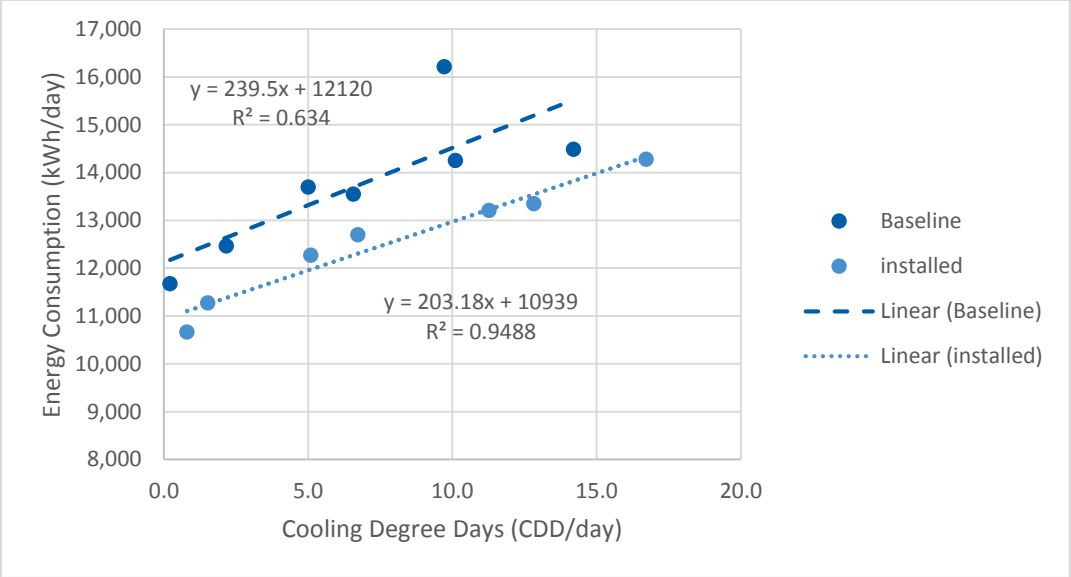
Custom HVAC

The Cadmus Team verified two custom HVAC projects, both involving HVAC controls. We determined that the measures had been installed and were operating as intended. We then reviewed the calculation methodology, available data, and implementer project reports. For one demand controlled ventilation project, the implementer relied on savings calculated through a deemed savings algorithm. We determined that the energy savings for that project were reasonable and did not require adjustment.

The other project involved a much more comprehensive upgrade to the facility cooling system. The implementer developed spreadsheet calculations to estimate energy savings based on the proposed system's operating parameters. Cadmus conducted a regression analysis to demonstrate a correlation between baseline (2014) and retrofit (2015) energy consumption as a function of cooling degree days (CDDs), as shown in Figure 14. Cadmus applied the regression equations with the TRM 5.0 value of 1,885 CDDs per year for Fayetteville, the nearest location to this facility. This resulted in greater energy savings than the reported value, leading to a 105% realization rate.

Figure 14. Baseline and Retrofit Regressions for HVAC Controls Project



Retrofit Lighting

Retrofit lighting represented 76% of the reported 2015 CIEEP savings, of which most (86%) was from a combination of linear and screw-based LED lighting. The Team verified that most of the measures were installed and operating appropriately, but we did identify several variables that required adjustments to the savings for those measures. We verified slightly lower savings than reported, for an overall realization rate of 98% for retrofit lighting measures. The primary sources of variance are summarized here.

- The Team conducted light logging to verify AOH at nine CIEEP participant sites in the manufacturing sector. The light logging results indicated that AOH in TRM 5.0 are overstated for the manufacturing sector. For manufacturing, across all four years of research, the Team has

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found 4,547 average AOH, compared to the TRM 5.0 value of 5,740 hours. We also determined that the coincidence factor for manufacturing is 0.63, compared with the TRM value of 0.89. For 2015, however, Cadmus did not apply these results across all manufacturing sites. Consistent with TRM 5.0 guidelines, the Team only adjusted the AOH for the specific projects on which we performed light logging. These adjustments resulted in lower retrofit lighting savings for some projects and higher savings for others, with the combined effect being essentially neutral in comparison to claimed savings.

- For some lighting fixture projects, the Team found discrepancies between the reported and verified fixture quantities or fixture wattages. In general, the resulting adjustments decreased energy savings.

Prescriptive HVAC

The Cadmus Team evaluated two prescriptive HVAC projects in new construction facilities. We reviewed the calculation methodology, available data, and implementer project reports. For the calculation methodology for these projects, we relied on a relationship between HVAC unit capacity, efficiency, and operating hours. We determined that the energy savings for one project was reasonable and did not require adjustment. For the other project, the implementer based the installed unit efficiency on the manufacturer's specification for seasonal energy efficiency ratio (SEER). The Cadmus Team obtained the manufacturer's specification for the unit's integrated energy efficiency ratio (IEER), which estimates unit efficiency on a seasonal basis. We applied that value to the TRM 5.0 algorithm, which increased energy savings and led to a 123% realization rate for that project.

Solar Photovoltaics

The Cadmus Team evaluated one solar PV project for the 2015 program. The project was installing 1,265 panels rated at 255 watts each, for a total installed capacity of 322.6 kW. The implementer used actual production data from the first year of operation to calculate the system's energy production of 405,620 kWh per year. The PV installation contractor also installed an interface to provide information on monthly and annual PV generation. The PV installation contractor independently estimated the PV system should generate 427,203 kWh per year. The Team was able to access the actual PV generation meter data, as shown in Figure 15. The metered data showed that the PV system produced more energy in 2015 (406,279 kWh), resulting in a 106% realization rate relative to program reported savings. However, the system failed to generate as much energy as predicted by the PV installation contractor.

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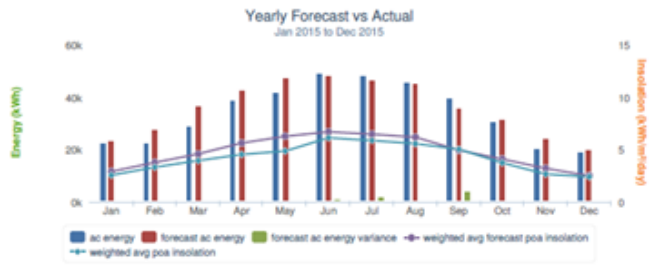
Figure 15. Inverter Meter Data



AC ENERGY YTD	FORECAST AC ENERGY YTD	FORECAST AC ENERGY VARIANCE YTD
406,279 kWh	427,203 kWh	-20,924 kWh

Month	Energy (kWh)		Solar Resource (kWh/m²/day)	
	Measured	Forecast	Measured	Forecast
Jan	22,357.0	23,345.0	2.5	2.9
Feb	22,436.0	27,623.7	3.3	3.7
Mar	28,908.0	36,692.5	3.9	4.5
Apr	38,540.0	42,405.3	4.5	5.6
May	41,773.0	47,225.2	4.8	6.2
Jun	48,936.0	48,039.1	6.1	6.7
Jul	48,104.0	46,473.0	5.8	6.4
Aug	45,603.0	44,989.6	5.5	6.1
Sep	39,621.0	35,555.9	5.0	4.9
Oct	30,542.0	31,266.8	3.7	4.0
Nov	20,354.0	24,017.6	2.6	3.2
Dec	19,105.0	19,569.5	2.4	2.5

On-Site Verification of the Computer Power Management Measure

The Team applied our on-site verification research for educational facilities, in which we found a 49% realization rate for installed equipment. This resulted in an overall 50% realization rate for energy savings and demand reduction for the CPM measure. The Cadmus Team conducted two rounds of site visits and site interviews for the 2015 program year, covering the 12 sites described below.

Background

TRM 3.0, effective January 1, 2014, was the first version to approve deemed savings values for installing CPM software. This software produces savings by allowing computers to enter a low-power "sleep" mode when idle. Since these deemed savings became available, this measure has had high uptake, primarily within the education sector.

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During the 2014 and 2015 evaluations, the Cadmus Team investigated the accuracy of savings calculation assumptions for this measure used in the TRM 3.0 (and which have remained consistent in TRMs 4.0 and 5.0) by conducting primary research on three separate occasions:

1. In January 2015, Cadmus visited eight schools across the state (four each in EAI and SWEPCO territories) that implemented CPM software. This informational study revealed several areas for further research, including deviations in the number of controlled units observed at schools compared to those reported in program tracking data.
2. In May 2015, in part to address comments from the implementer about the prior research, the Cadmus Team visited five participant sites, during which we interviewed on-site IT administrators. We also had further discussions (by phone) with representatives from two additional sites regarding their implementation of CPM software. All participants had installed the software during or after March 2014, within 14 months of the study.
3. The Team conducted a third round of research in January and February of 2016, interviewing five school district IT administrators about their experience with the program. All five participants had installed the software between December 2014 and May 2015 in both EAI and SWEPCO territories.

In the course of this research, the Team made several qualitative observations about trends in equipment installations and operation patterns. Specifically, we observed that on-site IT personnel had low engagement with the software and that several participants anticipated transitioning to new equipment (such as virtual computers or Google Chromebooks) that might limit future savings for CPM measures.

Appendix E outlines the research methods, consolidated findings, conclusions, and recommendations from these combined research efforts.[14]

Research Methods

The Cadmus Team conducted visual inspections of on-site conditions in 13 schools and had semi-structured in-person and telephone interviews with 20 school district IT administrators between January 2015 and February 2016. We interviewed all participants within 1.5 years of installing CPM software. Throughout each of these research efforts, the Team sought to examine equipment operating patterns

[14] Additional results from our 2014 research can be found in the Cadmus 2014 EM&V Final Report. Results from research performed in May 2015 can be found in the "Computer Power Management Software Study" memo dated July 31, 2015.

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and to discuss any developments with IT personnel that could limit the persistence of savings.[15] Specifically, we sought to identify:

- IT barriers to implementing CPM software.
- The numbers of desktops, laptops, and other devices actually managed through CPM software compared to reported counts.
- The various ways IT staff uses CPM software to manage energy savings schedules, and how this compares to unmanaged computers.
- The extent to which schools are shifting away from laptops in favor of Chromebooks.
- The extent to which laptops that are not in use are turned off and charging, making CPM savings redundant.

To estimate the savings realization rate for each hardware category of CPM software, the Team compared the reported number of managed systems with the numbers of managed desktop PCs, notebooks, and monitors provided by interviewed participants.

Summary of Findings from Three Rounds of Research

Number of Managed Systems

Fifteen surveyed participants from the three rounds of research who currently have the CPM software installed gave estimates of the total count and types of computers currently under CPM software control. There were five participants who removed the program entirely from their system. Table 19 shows the number of managed systems reported by each participant compared with the tracking system estimate of managed systems, which varies significantly from 0% at some sites to 226% for desktops and 700% for notebooks.

Table 19. 2015 Comparison of Number of Managed Systems

Research Wave and Participant ID	Vendor	Number of Desktops			Number of Notebooks*		
		Tracking System	Observed	Percentage Observed	Tracking System	Observed	Percentage Observed
3rd Wave, #1	Vendor 1	321	7	2%	323	33	10%
3rd Wave, #2	Vendor 1	695	675	97%	92	225	245%
3rd Wave, #3	Vendor 2	153	345	226%	74	518	700%
3rd Wave, #4**	Vendor 1	155	0	0%	19	0	0%
3rd Wave, #5**	Vendor 1	395	0	0%	392	0	0%
2nd Wave, #1	Vendor 2	700	719	103%	19	28	147%
2nd Wave, #2	Vendor 1	385	207	54%	65	89	137%
2nd Wave, #3	Vendor 1	492	427	87%	87	62	71%

[15] No power monitoring equipment was installed; energy savings data was not collected or evaluated. Our research efforts were directed at verification that measures were controlling equipment not savings from equipment that was under control.

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Research Wave and Participant ID	Vendor	Number of Desktops			Number of Notebooks*		
		Tracking System	Observed	Percentage Observed	Tracking System	Observed	Percentage Observed
2nd Wave, #4	Vendor 2	274	279	102%	12	38	317%
2nd Wave, #5	Vendor 1	344	192	56%	44	24	55%
2nd Wave, #6**	Vendor 1	260	0	0%	10	0	0%
2nd Wave, #7**	Vendor 1	181	0	0%	1	0	0%
1st Wave, #1	Vendor 1	784	N/A	N/A***	-	-	-
1st Wave, #2	Vendor 1	1699	170	10%	-	-	-
1st Wave, #3	Vendor 1	1262	820	65%	-	-	-
1st Wave, #4	Vendor 2	714	700	98%	-	-	-
1st Wave, #5	Vendor 1	329	N/A	N/A***	-	-	-
1st Wave, #6**	Vendor 1	233	0	0%	-	-	-
1st Wave, #7	Vendor 1	1173	282	24%	-	-	-
1st Wave, #8	Vendor 1	1261	353	28%	-	-	-
Total		**11,810**	**5,176**	**48%**	**1,138**	**1,017**	**89%**

* Notebooks were not included in the first wave of research.

** These participants reported removing the CPM software from their systems entirely.

*** At these two sites, IT staff did not know how to use the dashboard; thus, we have no on-site audit results, and tracker totals are not calculated in Percentage Observed.

Savings Estimates

Table 20 shows that, overall, the program's actual savings have been much lower than reported, with estimated savings from Vendor 1's CPM software being significantly overestimated by the tracker. Furthermore, while CPM software shows a low overall realization rate, Vendor 2 has a realization rate over 100%.

Table 20. Combined Realization Rates for Three Waves of Research

Vendor	Desktops*	Laptops*	Monitors*	Total Realization Rate	Participant Count (All Three Rounds)
Vendor 1	50%	85%	49%	36%	14
Vendor 2	119%	556%	119%	116%	4
Total	**65%**	**89%**	**66%**	**49%**	**18**

* The breakdown by hardware category only includes data from the two most recent rounds of research.

At the majority of sites in the sample, we observed a substantially lower number of managed computers than the number shown in the program tracking data. Overall, Cadmus observed that the number of managed computers ranged from 0% at some sites to 226% for desktops and 700% for notebooks compared to the number reported by vendors. We performed research in territories served by both utilities. The results are driven significantly by the vendor, not the utility. The findings of vendor 1 repeat themselves regardless of territory. We have combined our research across both EAI and SWEPCO

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territories and the multiple waves of research. This result corresponds to a 49% realization rate for verified energy savings in education facilities.

Evaluated Gross Demand Reduction and Energy Savings

The Team evaluated a sample of 24 completed projects. Table 21 and Table 22 show the final *ex ante* and *ex post* gross energy savings and demand reduction estimates by measure, respectively.

Table 21. CIEEP *Ex Ante* and *Ex Post* Gross Energy Savings

Measure	*Ex Ante* Gross Energy Savings (kWh)	*Ex Post* Gross Energy Savings (kWh)	Realization Rate
Air Compressor	1,235,549	1,262,397	102%
CFL	76,362	76,142	100%
Commercial Central AC Tune-Up	89,320	89,320	100%
Custom	779,269	779,269	100%
Custom HVAC	317,549	343,328	108%
Custom Lighting	191,622	191,622	100%
Delamping	62,447	48,692	78%
Door Gasket	170,213	170,213	100%
ECM for Refrigeration	2,556	2,556	100%
Faucet Aerator	217,327	217,327	100%
Fluorescent Other	29,101	27,579	95%
Freezer Door	4,345	4,345	100%
LED	10,728,244	10,526,983	98%
LED Exit Sign	4,092	4,092	100%
Linear Fluorescent	1,597,346	1,542,636	97%
Metal Halide Bulb	8,240	8,240	100%
CPM	517,263	258,166	50%
Pre-Rinse Spray Valve	84,840	84,840	100%
Refrigerator Door	16,250	16,250	100%
Solar PV	386,208	408,952	106%
Strip Curtain	21,534	21,534	100%
Unitary AC	182,955	184,918	101%
Vending Miser	70,928	70,928	100%

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Table 22. CIEEP *Ex Ante* and *Ex Post* Gross Demand Reduction

Measure	*Ex Ante* Gross Demand Reduction (kW)	*Ex Post* Gross Demand Reduction (kW)	Realization Rate
Air Compressor	168.65	166.79	99%
CFL	10.66	10.65	100%
Commercial Central AC Tune-Up	66.59	66.59	100%
Custom	196.31	196.31	100%
Custom HVAC	62.01	65.76	106%
Custom Lighting	40.69	40.69	100%
Delamping	6.99	5.60	80%
Door Gasket	2.99	2.99	100%
ECM for Refrigeration	0.29	0.29	100%
Faucet Aerator	63.35	63.35	100%
Fluorescent Other	0.58	0.58	99%
Freezer Door	0.50	0.50	100%
LED	1,657.25	1,655.37	100%
LED Exit Sign	0.61	0.61	100%
Linear Fluorescent	316.71	315.67	100%
Metal Halide Bulb	0.20	0.20	100%
CPM	26.10	13.02	50%
Pre-Rinse Spray Valve	9.41	9.41	100%
Refrigerator Door	1.82	1.82	100%
Solar PV	261.03	275.76	106%
Strip Curtain	2.45	2.45	100%
Unitary AC	37.20	37.20	100%
Vending Miser	1.32	1.32	100%

The Cadmus Team estimated *ex post* gross energy savings of 16,340 MWh, which resulted in a realization rate of 97% (see Table 23).

Table 23. CIEEP *Ex Ante* and *Ex Post* Gross Energy Savings

Ex Ante Gross Energy Savings (MWh)	*Ex Post* Gross Energy Savings (MWh)	Realization Rate
16,793	16,340	97%

The Team estimated an *ex post* gross demand reduction of 2,946 kW, which resulted in a realization rate of 100% (see Table 24).

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Table 24. CIEEP *Ex Ante* and *Ex Post* Gross Demand Reduction

Ex Ante Gross Demand Reduction (kW)	*Ex Post* Gross Demand Reduction (kW)	Realization Rate
2,934	2,933	100%

NTG Results

In 2015, the Cadmus Team used a 0.96 NTG ratio based on 24 participant surveys. Table 25 shows the final evaluated NTG for CIEEP. Applying the 0.96 NTG ratio to *ex post* gross savings results in *ex post* net energy savings of 15,669 MWh and demand reduction of 2,816 kW.

Table 25. Evaluated Net Savings

Metric	*Ex Post* Gross	*Ex Post* Net	NTG Ratio
Energy Savings (MWh)	16,340	15,687	0.96
Demand Reduction (kW)	2,933	2,816	0.96

Cadmus calculated freeridership rates for SWEPCO's CIEEP participants, following the analysis methodology outlined in the Introduction section of this report. Details specific to the CIEEP are outlined below.

Freeridership

As some customers installed more than one program measure, Cadmus assessed participant freeridership at the measure level rather than at the participant level. We estimated the overall participant freeridership rate for the program by identifying measures for which the respondent met the following criteria:

1. They had pre-existing plans to purchase or install the measure prior to learning about the program,
2. Their budget could have accommodated the full cost of the measure, and
3. Without the program they would have installed a program-eligible measure of the same (or higher) efficiency within a year.

The Cadmus Team asked 24 participants about 33 measures they installed through the program. We identified measures as freeriders that simultaneously met all three criteria. Responses indicated 10 freerider measures, leading to an *unweighted unadjusted* participant freeridership rate of 6%, as shown in Table 26.

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Table 26. CIEEP Unweighted Unadjusted Participant Freeridership Rate

Freeridership Criteria	Unweighted Percentage of Measures that Met Criteria (n=33)*
Prior Plans for Measure Installation	39%
Available Budget	15%
Stated Intent	21%
Unweighted Freeridership Rate (percentage of measures that met all three criteria simultaneously)	**6%**

* Twenty-four participants answered freeridership questions about 33 CIEEP-incented measures.

To account for the different savings values associated with each of the installed measures, Cadmus weighted the freeridership results by the program savings for each measure to estimate the final freeridership rate. The unweighted freeridership rate of 6% changed to 4% when we weighted the results by the savings associated with measures installed by customers.

The gross savings associated with the 33 measures in the program database summed to 3,284,509 kWh. Table 27 shows the gross and freerider savings corresponding with these freeridership ratings. We determined the weighted freeridership rate of 4% by dividing the total freerider kWh savings by the total non-freerider savings.

Table 27. CIEEP Participant Weighted Freeridership Rate

Stratum	Total Measures	Gross Savings (kWh)	Freeridership Rate	Freerider Savings (kWh)
Non-Freerider	31	3,162,205	0%	0
Freerider	2	122,304	100%	122,304
Total	**33**	**3,284,509**		**122,304**
Weighted Freeridership	**4%**			

Spillover

The Cadmus Team attempted to calculate spillover for end-user CIEEP participants. We quantified like-spillover, which is equipment installed outside the program that is exactly the same type and efficiency as the equipment offered through the program, where their experience with the program influenced their decision to implement the measures. The following criteria are required for a measure to be considered spillover:

- The service or measure must be offered in the program portfolio;
- The customer did not receive a rebate or incentive for the measure; and
- The customer's experience with the program was somewhat or very important in their decision to install the measure.[16]

[16] The Team asked participants to identify the extent to which the program influenced their non-program purchases using a scale of very important, somewhat important, not very important, and not important at all.

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Four program participants reported installing five spillover measures for which they did not receive a rebate and said that the program was important in their decision to install the measure. The information respondents provided about the measures was not detailed enough to enable Cadmus to estimate savings, so they are being reported qualitatively. Table 28 provides general descriptions of the additional measures respondents' reported installing.

Table 28. Participant Spillover Savings

Measures/Actions	Number of Responses
Interior lighting	1
Interior lighting with used fixtures	1
Exterior lighting	1
LED bulbs replacing lamps	1
Oven burner upgrade	1
Total	**5***

* Four respondents reported installing a total of five spillover measures.

Net-to-Gross

Table 29 presents the NTG ratio for CIEEP customers of 0.96.

Table 29. Net-to-Gross Ratio Values and Calculation

Parameter	Value
Weighted Freeridership Rate	4%
Spillover	0
Net-to-Gross Ratio (1 - Weighted Freeridership + Spillover)	**96%**

Process Evaluation Results

As noted above, the Cadmus Team conducted a condensed process evaluation in 2015. As such, our data collection activities included year-end interviews with the CIEEP utility and implementation managers and participant surveys.

Program Performance

CIEEP had its strongest year since inception in 2015, achieving considerable increases in gross kWh and kW savings compared to 2014, up 43% and 88% respectively. In addition, the program achieved 67% more completed projects in 2015 compared to 2014. Program staff reported that the measure mix, however, was less diverse than in years past; the drastic decrease in LED lighting costs led to increased installations of that measure type.

Program staff also stated that many customers, particularly larger customers, are continuing to have projects year after year. The SWEPCO program manager also stated that their "lunch and learn" outreach sessions are having a positive effect on the program and customers by allowing staff to speak to specific topics (such as LED lighting) and meet with customers directly. For example, one customer who attended a session on lighting chose to modify their project to better fit their needs and serve the facility better in the long run.

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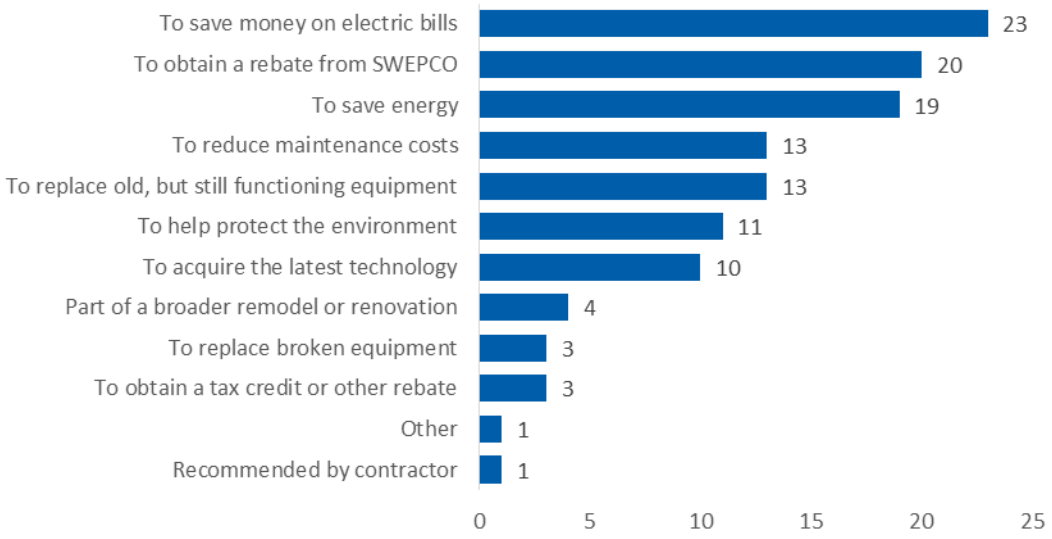
Program staff also reported placing a new emphasis on "community allies," focusing on the central-west region of SWEPCO's service territory. This area is more rural, and program staff sought to engage local business leaders and government officials. Staff reported positive results from this concentrated outreach effort.

Participant Survey Findings

As part of the participant survey, the Team asked customers about their interaction with the program and reasons for participating. Most customers stated that they participated in the program for financial reasons, such as saving money (23 of 24), obtaining a rebate (20 of 24), or reducing maintenance costs (13 of 24). However, saving energy was also important, cited by 19 of 24 respondents; Figure 16 shows these results.

Figure 16. Reasons for Participation



Source: 2015 CIEEP participant survey. "What factors were important in your decision to participate?" (n=24; multiple responses allowed)

These results are similar to 2013, when Cadmus completed the last participant survey. In 2013, all 11 surveyed participants stated that the incentive was important in their decision to install energy-efficient equipment.

The majority of 2015 respondents (17 of 24) stated that they faced challenges when making energy saving improvements. When asked, the high initial cost was the primary challenge, followed by budget limitations (Figure 17).

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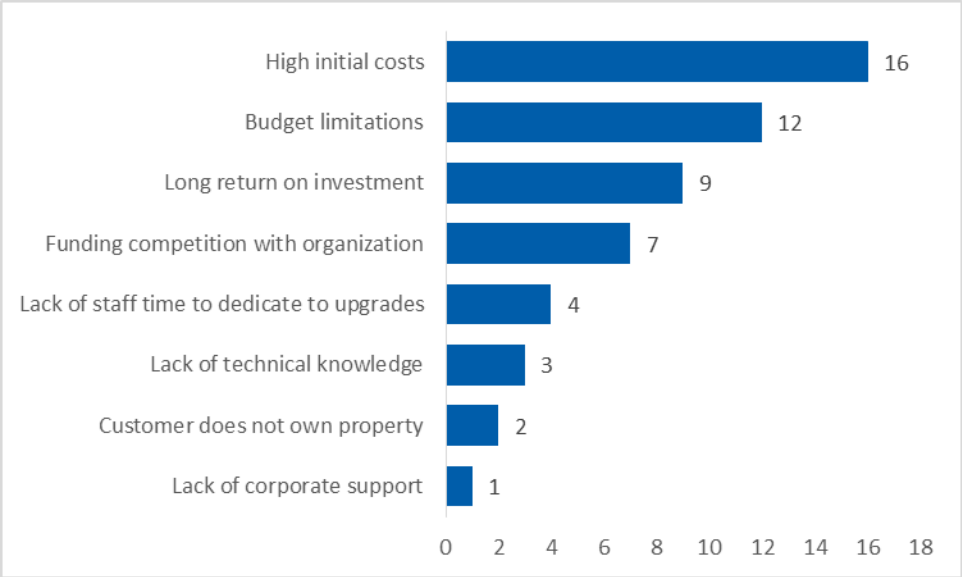
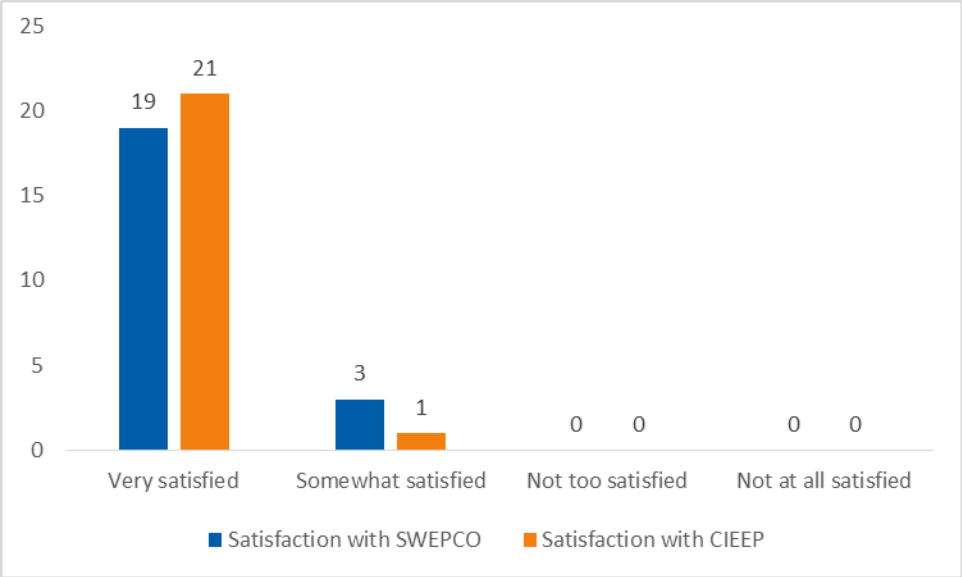
Figure 17. Challenges Faced When Making Energy Saving Improvements



Source: 2015 CIEEP participant survey. "What kinds of challenges does your organization face when making energy saving improvements?" (n=17; multiple responses allowed)

Overall, respondents reported high satisfaction with both SWEPCO as their utility provider and with the program. No customers reported being less than "somewhat satisfied" (Figure 18).

Figure 18. Satisfaction with SWEPCO and CIEEP



Source: 2015 CIEEP participant survey. "How satisfied are you with SWEPCO as your utility?" "How satisfied are you with your experience with the C&I Energy Efficiency Program?" (n=22)

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Only two customers provided responses when asked about what could be done to improve the program. One requested additional email follow up and communications, but did not specify from whom. The other customer requested an "online tool to quickly determine payback based on M&V data."

Marketing and Outreach

As in past years, program staff reported that direct outreach has been the most important source of project leads and program awareness for CIEEP. Program staff reported having a greater presence at events such as the Northwest Arkansas Business Expo and Chamber of Commerce meetings, and that these tabling opportunities provided time to meet with potential program participants in person. In 2015, program staff developed more sophisticated tracking mechanisms to understand where different leads came from. For example, they began tracking the click through rates on emails to customers.

2015 and Future Program Changes

Program staff reported that they plan to simplify the incentive structure for custom projects in 2016 to a $/kWh incentive only, and they are exploring adding several additional measures.

Progress on Implementation of Recommendations

SWEPCO has addressed all program recommendations to date. The Team did not make any recommendations for this program in 2014.

2015 Conclusions and Recommendations

The CIEEP was successful in 2015, exceeded its savings goals and not exceeding its budget. Customers were satisfied overall with both SWEPCO as their provider and with the CIEEP. Program staff reported that "strategies, measures, contractor relationships, and tools developed in previous years benefited the program in 2015." Overall, the program is maturing, and program staff are well positioned to push customers towards deeper retrofit opportunities in addition to lighting.

Conclusion: The implementer is applying an older version of the deemed methodology in the prescriptive point-of-sale compressed air algorithms.

Recommendation: The implementer should apply the maximum power value from the air compressor's CAGI data sheet rather than the air compressor's nominal power, based on the implementer's work paper from October 21, 2014.

Areas for Further Research

We recommend a full process evaluation for this program in the 2017 program year to correspond with SWEPCO's new Energy Efficiency Plan.

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Residential Lighting Program

Program Overview

Through RLP, SWEPCO offers discounted energy-efficient lighting products to residential customers through participating retailers. In 2014, SWEPCO enhanced the program measure list, expanding the available products of standard and specialty ENERGY STAR CFLs to also include ENERGY STAR LEDs. CLEAResult, the program implementer, administers the RLP with oversight from SWEPCO, working directly with retailers and manufacturers.

For most participating retailers, SWEPCO buys down the customer cost of qualifying lamps and reimburses the per-bulb incentive value to its manufacturer program partners. Participating retailers obtain qualifying lighting products through manufacturers, then the manufacturers invoice the program for program incentives based on sales volume by location. In other cases, a manufacturer representative works directly with program staff to manage program invoicing on behalf of the stores that stock its products.

2015 and Future Program Changes

The RLP has consistently achieved energy savings and demand reduction goals. Looking forward to 2016, staff anticipate making several changes, including the following:

- Integrating ENERGY STAR clothes washers from the Residential Appliance Program into RLP, and adding a new appliance measure, advanced power strips. In conjunction, SWEPCO will discontinue the Residential Appliance Program and rename RLP the Residential Lighting and Appliances Program.
- Implementing additional online promotions or long-term offerings.
- Enhancing customer outreach to promote awareness of program-eligible lamps, specifically LEDs, as well as awareness of the differences between ENERGY STAR and non-ENERGY STAR bulbs.
- Continuing to examine and mitigate leakage at the store level.
- Continuing to monitor EISA baseline changes and their impact on program savings.
- Investigating additional cost-effective lighting technologies, such as fixtures.

2015 Performance

In 2015, the RLP nearly reached its energy savings and participation goals, achieving 98% and 92% respectively, and exceeded its demand reduction goal by 287%. The program also came in slightly over budget, with SWEPCO spending 105% of available program funds.

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Overall, CFL sales amounted to 37,559 participants[17] in 2015, contributing 92% of the goal. LED program sales increased dramatically in 2015, with 5,604 participants;[18] this was in part due to SWEPCO offering LEDs all year, whereas in 2014, LEDs were only available for the second half of the year (June – December 2014).Table 30 shows a summary of program achievements.

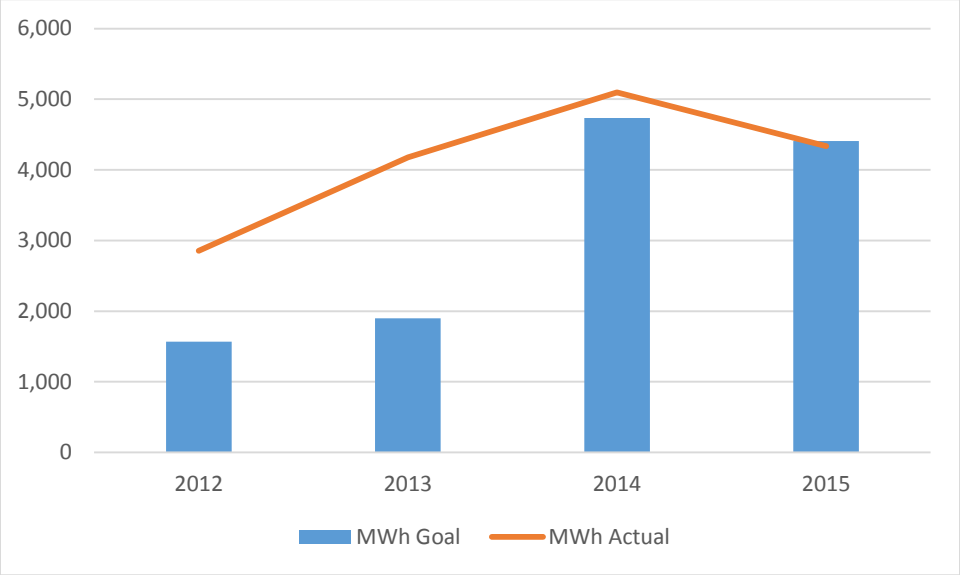
Table 30. RLP 2015 Goals vs. Actuals

	Filed Goal	*Ex Post* Actual	Percentage of Goal Achieved	2014-2015 Percentage Change*
Net Energy Savings (MWh)	4,410	4,336	98%	↓ 15%
Net Demand Reduction (kW)	217	840	387%	↓ 10%
Participation (6 CFLs per customer and 4 LEDs per customer)	47,083	43,157	92%	↑ 4%
Budget	$580,141	$610,585	105%	↑ 8%

* Change in actual achieved results and spending from 2014.

The RLP has had very strong performance every year since launching, and has ramped up to a relatively stable level. After increasing the RLP energy savings goal substantially and achieving that aggressive target in 2014, SWEPCO reduced the goal slightly from the 2014 level in 2015. SWEPCO missed the slightly lower goal in 2015 by only 2%. Figure 19 represents the RLP annual energy savings goals and achievements from 2012 to 2015.

Figure 19. Residential Lighting Program Goals vs. Actual, 2012-2015



[17] Based on an assumption of six CFL bulbs per participant.

[18] Based on an assumption of four LED bulbs per participant.

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SWEPCO's continued efforts to ensure that memoranda of understanding with retailers were in place prior to 2015 or very early into the year helped the program run smoothly. In addition, the implementer's strong presence maximized partnerships with participating manufacturers and retailers, including a proactive field protocol first deployed in 2014. At the beginning of each quarter, SWEPCO determined which program lamps were and were not selling well. Based on these assessments, and striving to maximize savings per incentive dollar, SWEPCO shifted incentive funds from poor performing lamps and retailers (in terms of customer sales) to higher performing lamps and retailers. Furthermore, program staff introduced a new online platform, working with online retailer Techniart, to sell directly to customers. This one time promotion in October was extremely successful, with 500 units selling out in less than three hours.

Approach

Table 31 lists the EM&V activities the Cadmus Team performed for the RLP in 2015.

Table 31. 2015 RLP Analysis Activities

Impact Evaluation	NTG	Condensed Process Evaluation
• Database and document review • TRM deemed savings calculation review	• Econometric demand elasticity model (CFL 64%, LED 36%)	• Year-end interviews - Utility Program Manager (n=1) - Implementer Manager (n=1)

Below, we provide specific information regarding the Cadmus Team's research and analyses. Appendix A provides detailed descriptions of Cadmus' general research and analytical methods.

Impact Evaluation Approach

Cadmus conducted an impact analysis in conformance with the guidelines provided in TRM 5.0. Specific impact evaluation activities are described below.

Database and Document Review

To inform the 2015 impact and process evaluations, the Cadmus Team reviewed the following materials:

- Program status reports
- Program participation database
- Sales promotion and price data

TRM Deemed Savings Calculation Review

The Team reviewed all program-reported tracking data to ensure that the implementer correctly applied TRM 5.0 inputs and assumptions for calculating savings. For each measure, we re-calculated savings using the TRM algorithms to obtain *ex post* savings values.

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NTG Evaluation Approach

The Cadmus Team calculated a new NTG percentage for the RLP in 2015 to account for the effects of EISA and the increasing market acceptance of LEDs. The Team estimated NTG using an economic demand elasticity model (DEM) approach.

Econometric Demand Elasticity Model Method

The Cadmus Team used an econometric DEM to develop freeridership ratios for program CFL and LED measures. DEM is based on the same economic principle that drives program design: that a change in price and promotion generates a change in quantity sold (also known as upstream markdown). For this modeling, the Team used sales and promotion information to:

- Quantify the relationship of price and promotion to sales (elasticity)
- Determine the likely level of sales without program intervention (baseline sales)
- Estimate freeridership by comparing modeled baseline sales with actual sales

Cadmus estimated freeridership using both SWEPCO and EAI program data on lighting sales, bulb prices, promotional activity, and quantity of lamps purchased, and bulb and retailer characteristics. We used data from both utilities' programs in the model to increase the robustness of the elasticity estimates. There was significant overlap in the product and retailer mix between the EAI and SWEPCO programs to justify combining the programs. The Team included storefront level fixed-effects to control for demographic differences between storefront locations within the same retailer, both within and between the two utilities' service territories.

- Since the model relies on combined data and the model parameter estimates are based on a combination of the EAI and SWEPCO programs, the average change in sales is a response to changes in prices. However, we based all the predicted sales and savings used to develop the freeridership estimates solely on SWEPCO program data, and they reflect the retailer and product mix, as well as price levels, unique to SWEPCO's program.
- After estimating variable coefficients, we used the resulting model to predict sales that would have occurred without the program's price impact, as well as sales that would have occurred with the program (and which should be close to actual sales with a representative model). We then calculated freeridership using the following formula:
- $Freeridership\ Ratio = \left(\frac{Predicted\ Sales\ without\ Program}{Predicted\ Sales\ with\ Program}\right)$

Secondary Research for Spillover

The Cadmus Team reviewed spillover results from upstream lighting program evaluations in several different utility jurisdictions outside Arkansas. These evaluations used two primary spillover analysis methodologies: surveys and home inventory comparisons. A detailed summary of the Team's research methods and findings is provided in Appendix F. After consulting with the IEM, the Team followed the more conservative approach of applying only the self-report values to the Arkansas evaluation (see call out box).

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Self-Report Spillover Research

This approach relies on surveys of a sample of residential program participants and/or nonparticipants within the utility jurisdiction. Surveys are designed to determine if customers purchased non-discounted bulbs, and if so, whether their purchasing decision was influenced by the program. Program influence may be based on prior participation, exposure to program marketing, or other ways the program raised customer awareness of efficient bulbs. Customer responses indicating strong program influence on the purchase of non-discounted bulbs are attributed to spillover. The number of spillover bulbs in the sample is extrapolated to the population of program participants to determine the percentage of spillover savings relative to overall program savings.

Process Evaluation Approach

In accordance with TRM 5.0 Protocol C and the SWEPCO approved 2015 EM&V Plan, the Cadmus Team conducted a *condensed* process evaluation of the RLP in 2015. Yearly trends showed reasonable program growth during each year of delivery, and in 2014, the program exceeded its goals. Additionally, because the program has remained consistent and SWEPCO has indicated no significant challenges or concerns with the program, the Cadmus Team determined that a condensed process evaluation was appropriate for RLP.

Program Staff and Implementer Interviews

The Cadmus Team conducted year-end interviews with the SWEPCO RLP program manager and CLEAResult implementation manager. We primarily focused these interviews on program performance for the 2015 year, activities to address previously identified recommendations, and plans for the program in SWEPCO's 2016-2018 Energy Efficiency Plan.

Evaluation Findings

Impact Evaluation Results

The following sections present the findings from each impact evaluation activity.

Database and Document Review

The Cadmus Team reviewed the participation database for completeness and accuracy. We also reviewed various pricing and sales data for the DEM, and determined that the data were sufficient for evaluation.

Evaluated Gross Demand Reduction and Energy Savings

The Cadmus Team estimated *ex post* gross energy savings of 7,133 MWh, which resulted in a realization rate of 98% (see Table 32).

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Table 32. RLP *Ex Ante* and *Ex Post* Gross Energy Savings

Measure	*Ex Ante* Gross Energy Savings (MWh)	*Ex Post* Gross Energy Savings (MWh)	Realization Rate
CFLs	6,478	6,347	98%
LEDs	795	786	99%
Total	**7,274**	**7,133**	**98%**

The Team estimated an *ex post* gross demand reduction of 1,381 kW, which resulted in a realization rate of 98% (see Table 33).

Table 33. RLP *Ex Ante* and *Ex Post* Gross Demand Reduction

Measure	*Ex Ante* Gross Demand Reduction (kW)	*Ex Post* Gross Demand Reduction (kW)	Realization Rate
CFLs	1,262	1,229	97%
LEDs	155	152	98%
Total	**1,417**	**1,381**	**98%**

TRM Deemed Savings Calculation

To determine savings from upstream lighting measures, the Team applied algorithms and used parameter values from TRM 5.0. Overall, the evaluation achieved high realization rates, driven in part by SWEPCO allocating 6.7% of bulbs to commercial applications. The following details describe the adjustments we made to savings calculations that drove realization rates for lighting measures.

Both the Cadmus Team and SWEPCO applied weighted values for hours of operation and coincidence factors to account for 6.7% of purchased lamps being installed in commercial applications. This calculation is stipulated in TRM 5.0.

Due to the upstream program incentive mechanism, the Team did not know the baseline lamp wattage that efficient program lamps replaced. Therefore, we used a lumens equivalence methodology, as outlined in the Uniform Method Project (UMP), and the ENERGY STAR guidelines for lamp efficacy to evaluate delta watts and determine the baseline wattages for lamps sold through the upstream program. This method allowed us to determine the light output of the purchased program lamp, which we then used to assign a baseline wattage; this resulted in a 2% decrease in savings.

The Team used two primary methods to determine the light output of program lamps, as outlined below. Once we determined the light output of the program lamp, we binned the value according to the ENERGY STAR guidelines and assigned a baseline wattage. 2015 was the first program year the Cadmus Team used ENERGY STAR-defined lumens bins instead of EISA-defined lumens bins. We implemented this change in accordance with the most recent version of the UMP.

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Lumens Equivalence Method via ENERGY STAR Lookup

The lumens equivalence method is the Team's preferred methodology, and we used this approach for as many program lamps as possible. The Team looked up the program lamp in the ENERGY STAR database—using the lamp's stock keeping unit (SKU) and/or model number—and applied the official ENERGY STAR lumens value.

Lumens Equivalence Method via Regression Equations

For products Cadmus was not able to match using the ENERGY STAR database, we assigned an appropriate lumens value using regression equations based on the entire ENERGY STAR Qualified Product List. The Team determined regression equations for eight different lamp categories: CFL and LED standard, CFL and LED reflector, CFL and LED EISA-exempt, and CFL and LED fixtures.

Figure 20 and Figure 21 show the regression equations for CFL and LED standard lamps, with the high R^2 value indicating that each regression had a strong linear fit (with an R^2 value of 1.0 being a perfect fit). Each data point in the figures below represents the median lumens value for an ENERGY STAR-listed wattage of the given lamp category.

Figure 20. ENERGY STAR Median Lumens for Standard CFL Lamps

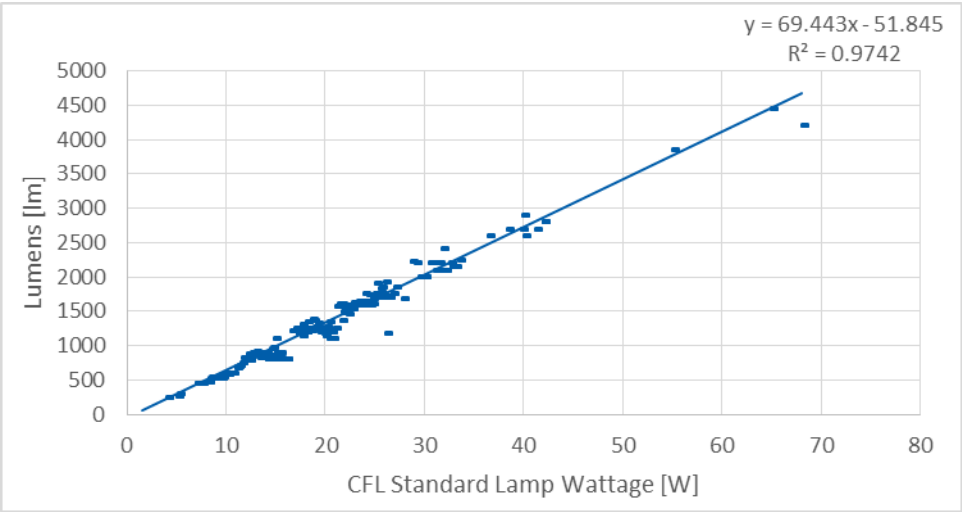

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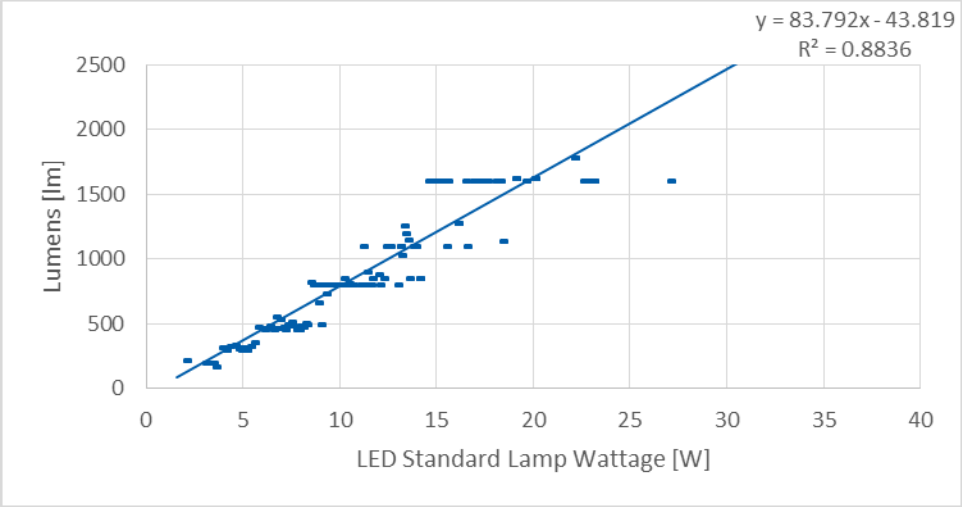
Figure 21. ENERGY STAR Median Lumens for Standard LED Lamps



The Team matched 89.6% of all lamps (90.5% of CFLs and 80.6% of LEDs) to the ENERGY STAR database using either the SKU or model number. For the remaining 10.4% of lamps, we assigned baselines using the regression equation methodology.

Table 34 and Table 35 show inputs the Team used in the savings analysis for CFLs and LEDs, respectively.

Table 34. 2015 CFL Savings Algorithm Inputs

Input	Residential	Commercial	Overall
Weight	93.3%	6.7%	100%
HOU	2.17	10.14	2.71
ISR Year 1	98.00%	98.00%	98.00%
IEF_e	0.97	0.98	0.97
IEF_d	1.25	1.20	1.25
IEF_g	-0.01	0.00	-0.01
CF	0.10	0.83	0.15
Days/year	365.25	365.25	365.25

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Table 35. 2015 LED Savings Algorithm Inputs

Input	Residential	Commercial	Overall
Weight	93.3%	6.7%	100%
HOU	2.17	10.14	2.71
ISR Year 1	98.00%	98.00%	98.00%
IEF_e	0.97	0.98	0.97
IEF_d	1.25	1.20	1.25
IEF_g	-0.01	0.00	-0.01
CF	0.10	0.83	0.15
Days/year	365.25	365.25	365.25

NTG Results

The following sections present findings for the two components of NTG: freeridership and spillover.

Freeridership: Econometric Demand Elasticity Model

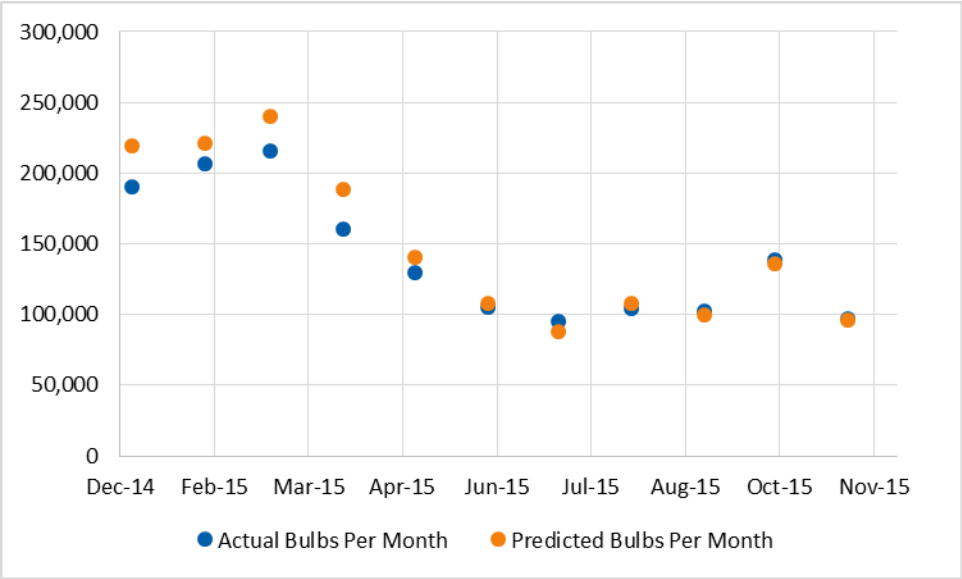
The Cadmus Team developed a DEM using program data on prices, the number of lamps purchased, and lamp and retailer characteristics.

Model Specification

The Team modeled the data as a panel, using a cross-section of program bulb quantities over time as a function of prices, promotional events, and retail channels.

The fit of the model can be determined by comparing the model-predicted sales with actual sales. As shown in Figure 22, the model-predicted sales match the actual sales very closely with no persistent bias, indicating a good model fit.

Figure 22. Predicted vs. Actual Bulb Sales



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Elasticities

The net-of-freeridership ratios derive from the estimate of a price elasticity of demand. The price elasticity of demand is a measure of the percentage change in the quantity demanded (bulb sales) given a percentage change in price. Due to the model's logarithmic function, the coefficients represent the elasticity for each price variable. The sign of the coefficient specifies the relationship between changes in both the quantity demanded and price. A negative coefficient indicates that an increase in price correlates with a decrease in sales, and vice versa. In previous, similar analyses, Cadmus has seen elasticities range from -1 to -3 for CFLs, indicating that a 10% drop in price corresponds with a 10% to 30% increase in the quantity sold.

The Cadmus Team categorized bulb sales by the retail channel through which the bulbs were purchased (i.e., do-it-yourself (DIY) stores, hard-to-reach (HTR) stores, or mass market retailers); measure type (LED or CFL); and bulb type (standard, specialty, or reflector). Table 36 depicts the average elasticity estimates for each category.

Table 36. Modeled Elasticities by Bulb Type and Retail Channel

Retail Channel	Measure	Bulb Type/Technology	Average Elasticity Coefficient
DIY	CFL	Reflector	-1.46
		Specialty	-1.49
		Standard	-1.50
	LED	Reflector	-1.03
		Specialty	-1.22
		Standard	-1.11
HTR	CFL	Standard	-0.82
Mass Market	CFL	Reflector	-0.93
		Specialty	-1.51
		Standard	-1.18
	LED	Reflector	-1.52
		Specialty	-1.74
		Standard	-1.79

Most elasticities fell within an expected range, based on previous analyses. The average elasticity estimates of -0.82 for HTR standard CFLs and -0.93 for mass market reflector CFLs indicate that sales and prices of those particular bulb types have a negative relationship, as expected, but sales are slightly less sensitive to price changes than they are for a standard, mass market LED.

The HTR channel had the least amount of price variation to estimate specific elasticities. However, all estimates were statistically significant and not estimating HTR-specific elasticities raises questions about representativeness of the other channels.

Overall, there was not a significant difference between CFL and LED elasticities.

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The model included sufficient variation in both price and products featured in off-shelf merchandising displays that the Team was able to successfully estimate impacts for merchandising activity, separately and in addition to price.

Table 37 shows the coefficients for off-shelf placement. These represent the average monthly sales lift when a program bulb is featured in an off-shelf display, such as an end-cap. The sales lift from merchandising is greater than the price impacts with monthly sales increasing by 53% for specialty LEDs up to 108% for standard CFLs.

Table 37. Modeled Off-Shelf Placement Sales Lift by Measure and Bulb Type

Measure	Bulb Type/Technology	Average Off Shelf Coefficient
CFL	Standard	1.08
LED	Reflector	0.65
	Specialty	0.53
	Standard	0.79

Data Adequacy

The program data from each utility contained a wide variety of products with observed variation in program prices, promotional activity, or both. As previously mentioned, the Team modeled sales by categories that reflected the bulb type, technology, and baseline wattage the bulb was meant to replace. For example, the EISA baseline for a standard, 60-watt incandescent replacement bulb is 43 watts. Therefore, we created a category for standard, 43-watt lamps. Then we modeled bulb sales to reflect the change in sales within each category in response to the per-bulb price within each category and each retail channel.

Modeling bulb sales this way captures price variation caused by factors that include:

- Changes to the incentive amount or the regular retail price absent incentives for a specific product (SKU);
- New products introduced to the program;
- Changes in pack size offerings; or
- Substitution effects (in this case, the displacement of one bulb by a cheaper and comparable, if not identical, bulb alternative).

The SWEPCO price and sales data mapped very closely and left no observations that we could not match to prices.

Freeridership Results

Table 38 presents freeridership estimates by measure.

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Table 38. Freeridership by Measure

Measure	Freeridership
CFL	45%
LED	73%

The freeridership estimates, like the elasticity estimates, vary due to differences in product mix and incentive levels by retail channel, measure, and lamp type, and by differences in promotional activity. The two primary drivers of differences in freeridership rates between CFLs and LEDs are the average elasticities and the proportional markdown (the incentive relative to the original price). Table 39 shows the average price per bulb and corresponding freeridership by retail channel and bulb type. Elasticities were presented in Table 36.

Table 39. Program Freeridership and Prices by Retail Channel, Measure, and Lamp Type

Retail Channel	Measure	Lamp Type	Original Price	Retail Price	Incentive	Markdown	Freeridership
DIY	CFL	Reflector	$4.52	$3.52	$1.00	22%	76%
		Specialty	$4.91	$3.91	$1.00	20%	77%
		Standard	$2.35	$1.37	$0.98	42%	35%
	LED	Reflector	$18.56	$14.27	$4.29	23%	89%
		Specialty	$19.01	$16.01	$3.00	16%	80%
		Standard	$10.60	$7.69	$2.91	28%	70%
HTR	CFL	Standard	$1.68	$0.43	$1.25	74%	33%
Mass Market	CFL	Reflector	$5.92	$4.92	$1.00	17%	85%
		Specialty	$6.77	$5.77	$1.00	15%	81%
		Standard	$1.61	$0.61	$1.00	62%	49%
	LED	Reflector	$13.58	$10.58	$3.00	22%	69%
		Specialty	$9.31	$6.31	$3.00	32%	45%
		Standard	$9.52	$6.61	$2.92	31%	61%

Freeridership ratios do not intuitively align with the elasticities. For example, standard CFLs sold in HTR stores exhibited the least sensitive average elasticity coefficient (-0.85) but the highest net-of-freeridership ratio (67%). This is because net-of-freeridership is a function of both the sensitivity of sales to price changes and the magnitude of price changes, which was the greatest at 74%.

LEDs exhibited higher freeridership primarily because the markdown levels were considerably lower for LEDs (between 16% and 32%) compared to CFLs, particularly standard bulbs that accounted for the majority of program sales and had a maximum markdown of 74% in the HTR market.

Figure 23 plots the relationship between the average percentage markdown and the average freeridership for each of the categories in Table 39. Each point represents a technology and channel. Although small differences in price elasticity affect the relationship between the markdown and

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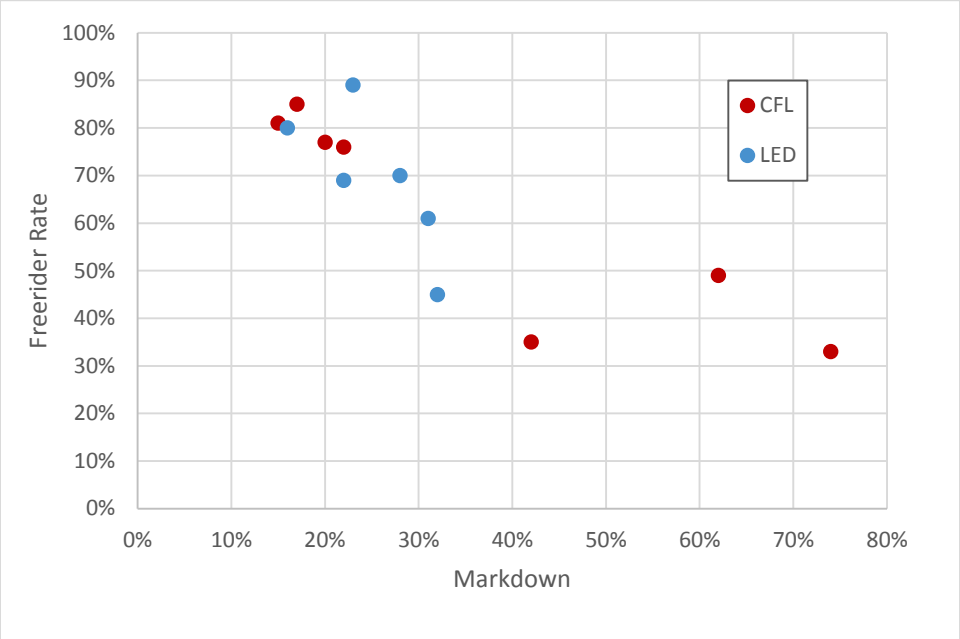
freerider rate for each combination, the general relationship between markdown and freeridership is clear.

Figure 23. Percentage Markdown and Freerider Rate



Spillover

To determine an appropriate spillover value, the Team reviewed spillover results from upstream lighting program evaluations in several different utility jurisdictions outside Arkansas. These evaluations used two primary spillover analysis methodologies: surveys and home inventory comparisons.

Our review of the findings revealed a pattern, with the two highest spillover values deriving from home inventory research and the lowest values deriving from survey research. This suggests that survey respondents may be more likely to underestimate the effect of the program on their decision making, while the home inventory approach may overestimate the program spillover and market effects. After consulting with the IEM, the Team applied the more conservative approach of using only the self-report values for the Arkansas evaluation. A detailed summary of this research and the Team's findings is provided in Appendix F.

Spillover Review Results

The Team reviewed five studies, but only three used the more conservative self-report method. These are summarized in Table 40. The straight average of the three self-report surveys from this table yields a spillover value of 9.3%.

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Table 40. Upstream Lighting Spillover Values

Utility	Reporting Year	Spillover Value	Survey Details
Progress Energy Carolinas	2012	7%	General population survey of 605 residential utility customers, including participants and nonparticipants. Survey asked respondents if they purchased full-priced CFLs, were aware of the program, were highly influenced by the program, and number of bulbs purchased (if applicable).
Xcel Energy Minnesota	2012	10%	Survey of 410 program participants to determine if they had purchased additional energy-efficient lighting measures after participating, if they were influenced by the program to do so, and how many units they purchased.
Public Service Company of New Mexico	2013	11%	Telephone survey of 68 program participants, inquiring whether they purchased non-incentivized CFLs and, if so, what motivated the purchase.

Net Results

SWEPCO's LED lamps were predominantly sold through DIY retailers, which includes hardware and big-box home improvement stores. CFLs, conversely, were sold primarily through non-DIY retailers, largely discount chain stores. Savings freeridership values are shown in Table 41, broken out by retail channel and type of bulb.

Table 41. Freeridership by Lamp Type and Retail Channel

Lamp Style	Retail Channel	Bulb Sales	Percentage Markdown	Freeridership
LED	DIY Store	32,033	26%	75%
	Mass Market Store	15,529	28%	61%
CFL	DIY Store	2,393	39%	40%
	HTR Store	194,254	74%	33%
	Mass Market Store	10,090	62%	49%

The Team estimated that LEDs have higher freeridership than CFLs, primarily because the proportional markdown for LEDs was roughly 50% lower than for CFLs. Elasticities were not dramatically different between LEDs and CFLs overall, so the primary factor that accounts for the difference in freeridership is the markdown. CFLs at non-DIY stores, particularly at HTR stores with the greatest markdown, accounted for the vast majority of program sales and savings, and therefore carried most of the weight in the final overall freeridership estimate of 52%.

Table 42 shows the final evaluated NTG for the RLP. Applying the NTG percentages (63.8% for CFL and 36.1% for LED, for a blended NTG ratio of 61%) to *ex post* gross savings results in *ex post* net energy savings of 4,336 MWh and demand reduction of 840 kW.

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Table 42. Evaluated Net Savings for RLP

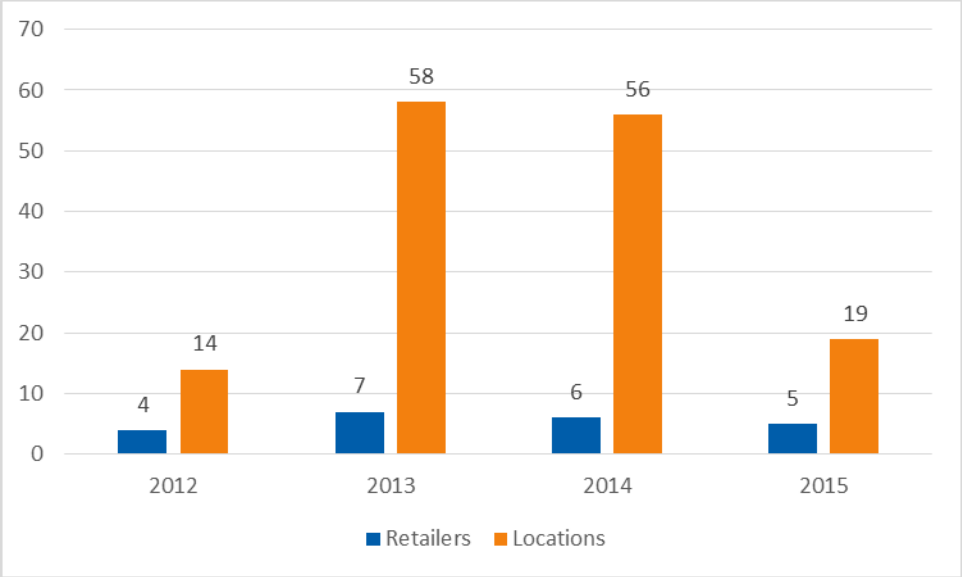
Metric	*Ex Post* Gross	*Ex Post* Net	NTG Ratio
Energy Savings (MWh)	7,133	4,336	61%
Demand Reduction (kW)	1,381	840	61%

Process Evaluation Summary

As noted above, the Cadmus Team conducted a condensed process evaluation in 2015. As such, our data collection activity was having year-end interviews with the RLP program and implementation managers.

As discussed in the 2015 Performance section above, the availability of LEDs throughout the 2015 year resulted in more LEDs being sold than forecasted. However, the program fell short of its goal and achieved lower program savings in 2015 than in 2014. Although one retailer exceeded its budget in 2015, SWEPCO reallocated funding from another retailer to cover the overage, minimizing the overall impacts. While program staff reported strong relationships with retailers, one of the retailers, Dollar General, did drop out of the program in 2015. This is reflected in Figure 24, showing the year-over-year trend of retailers and locations active in the program. Program staff did report, however, that Dollar General will participate in 2016, but with a rotating display instead of stocking bulbs all year. Program staff also stated that Sam's Club will not participate in 2016; in 2015, only one Sam's Club participated in the RLP.

Figure 24. Participating Retailers and Locations, 2012-2015



In 2015, SWEPCO began to experiment with an online platform to sell discounted lighting products directly to its customers. Working with online vendor Techniart, SWEPCO ran an online promotion that proved extremely successful, with 500 units selling out in just three hours. This online format allowed

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program staff to reduce leakage by requiring customers to enter ZIP codes prior to purchase. The kit, containing LED bulbs as well as an advanced power strip, benefitted both RLP as well as RSOP.

Market Effects

With the full implementation of EISA in 2014, the baseline energy consumption of general purpose lamps has changed; to account for this increased baseline, SWEPCO lowered the RLP savings goal in 2015 from the 2014 goal.

Implementation staff noted that the presence of non-ENERGY STAR LEDs may pose challenges for the program in the future. Programs such as SWEPCO's RLP, which require program-discounted lamps to be ENERGY STAR-certified, are crucial to ensuring that high-quality lighting products are available in the market. In regions of the U.S. where lighting programs are not offered, retailers primarily sell non-ENERGY STAR LEDs, since they are much less expensive than ENERGY STAR-certified lamps. Program staff reported that this is potentially problematic since ENERGY STAR certification requires lamps to achieve certain quality standards in addition to efficiency standards. Without the quality control inherent in ENERGY STAR certification, LEDs may encounter similar problems as CFLs (i.e., customers were not satisfied with their performance and were reluctant to purchase additional lamps).

Cadmus also notes that the ENERGY STAR Lamps Specification 2.0 is anticipated to take effect in January, 2017, which will bring a new standard of efficient bulbs to market and offer expanded measure options for SWEPCO's program.

Leakage

Appreciable leakage of upstream lighting products continues in SWEPCO's service territory.

In the SWEPCO 2012 *Energy-Efficiency Portfolio Evaluation Report*, the Cadmus Team noted our suspicion that a significant portion of program bulbs distributed through the RLP are leaked to areas outside its service territory. In 2013, under direction from the IEM and drawing on the TRM 3.0 Protocol K, the Team quantified this leakage rate by conducting a multimode survey of 3,000 randomly selected Arkansas residents, in which we quantified their distance from and travel time to stores where they would commonly purchase lighting products. Cadmus collected 532 survey responses from customers representing approximately 40 different utilities throughout Arkansas,[19] and we applied the responses to the quantity and configuration of stores participating in SWEPCO's Residential Lighting Program. This yielded a SWEPCO leakage value of 65.4% for 2013, a decrease of 0.1% from the evaluated leakage rate in 2012. Thus, net program savings exclusive of leakage are 1,500 MWh and 291 kW.

In 2015, the Cadmus Team estimated leakage by applying the 2013 leakage rate estimate by store to the number of program sales by store. This resulted in an estimated leakage rate of 66.3% for 2015.

[19] Due to respondents' use of different shortened utility names and abbreviations, we were not able to determine the exact number of utilities they represented.

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Progress on Implementation of Recommendations

Table 43 lists the status of the 2014 recommendation for the RLP. As shown, Cadmus made only one recommendation in 2014 and SWEPCO has addressed it.

Table 43. Status of 2014 RLP Recommendation

Year	Recommendation	2014 Status
2014	Include a wider selection of LED Models among the 2015 program eligible lamps, including a variety of wattages, features, and colors.	***Completed.*** CLEAResult reported adding additional LED varieties, all of which were ENERGY STAR certified.

2015 Conclusions and Recommendations

The RLP has consistently served SWEPCO's residential market with easily accessible, low-cost efficient lighting options since 2012. SWEPCO came close to achieving its RLP energy savings goal and saw a significant increase in demand reduction in 2015. LEDs saw significant growth, due to their continued decrease in price as well as their availability throughout the whole program year.

Conclusion: New methods of reaching customers such as the online promotion proved to be very successful for the program and helped program staff address leakage.

Recommendation: Increase the number of online promotion offerings and consider offering different products at different times throughout the year.

Conclusion: ENERGY STAR Lamps Specification Version 2.0 was finalized on December 31, 2015 and revised in February 2016. The Lamps V2.0 specification will replace the Lamps V1.1 specification on January 2, 2017. The new specification is expected to permit lower-cost lamps to achieve certification.

Recommendation: During program year 2016, develop a plan to offer bulbs for 2017 that meet the new ENERGY STAR 2.0 specifications.

Conclusion: In program year 2016, SWEPCO will add clothes washers to the newly created Residential Lighting and Appliances Program. However, calculating savings using the TRM 5.0, requires information on the installed units' configuration for top or front loading.

Recommendation: For the clothes washer measures, the implementer should collect information about whether incentivized units are top or front loading.

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Residential Standard Offer Program

Program Overview

Through the RSOP, SWEPCO provides standard home improvement rebates for residential customers, and the Multifamily Direct Install Pathway for multifamily buildings. Through the single-family component, SWEPCO provides prescriptive incentives for residential customers who purchase a new high-efficiency central AC, heat pump, insulation, duct sealing, duct insulation, ENERGY STAR windows, window film, air infiltration measure, and/or water heater. The post-installation program QC protocol may include a walk-through home energy assessment, conducted by program staff, which was implemented in 2014.

Customer Requirements

The RSOP is available to all residential customers served by a SWEPCO electric meter.

- SWEPCO offers home improvement rebates to customers in residences with up to three dwelling units.
- Through the Multifamily Direct Install Pathway, SWEPCO targets existing buildings with four or more occupied tenant units.

Through the Multifamily Direct Install Pathway, participating contractors install CFLs, high-efficiency showerheads, and faucet aerators in tenant units at no cost to multifamily property owners or tenants after a walk-through assessment with an Energy Advisor. Since 2014, SWEPCO has also offered air and duct sealing to multifamily property owners; and in 2015, added energy-efficient power strips to the direct install measures. Through the Multifamily Direct Install Pathway, SWEPCO provides property owners with an incentive of $15.00 per tenant unit where three or more measures are installed.

2015 and Future Program Changes

Due to the consistent performance of RSOP, SWEPCO refrained from making substantial changes to the primary program measures and processes in 2015, but made several minor changes to program offerings. SWEPCO added a $100 per project bonus when contractors achieved the top tier of savings in duct sealing and air infiltration (≥75% and ≥40% of leakage reduction, respectively). SWEPCO also tightened the minimum requirement percentages for air infiltration (the minimum reduction requirement levels for the two tiers). Previously, the two tiers were for minimum leakage levels of ≥15% and ≥30%. In 2015 they were updated to ≥20% and ≥40%. In May 2015, SWEPCO also added advanced power strips to the RSOP Multifamily Direct Install Pathway.

Additionally, SWEPCO made a few key strategic changes to its marketing and outreach approach in 2015. As part of this modification, the portfolio's 1-800 number was moved from an external call center to an in-house operation. Program staff reported making this change because they felt that an internal call center staff would be more effective. To better control the flow of information for multifamily properties and to facilitate program prequalification for those properties, the implementation team took over the majority of outreach activities. This allowed them to identify the best projects for participating multifamily properties and push contractors to achieve deeper savings.

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Changes to the TRM also affected the RSOP. Instead of the previous two ceiling insulation baseline tiers (R0 to R8 and R9 to R22), the updated TRM has five tiers in smaller increments (R0 to R1, R2 to R4, R5 to R8, R9 to R14, and R15 to R22). However, the corresponding incentives offered for this measure remained the same.

For 2016, SWEPCO has changed the program name to Residential Energy Improvement Program (REIP). Through REIP, SWEPCO will continue to offer window measures, duct sealing, air infiltration, HVAC measures, and direct install measures. The program will continue to include both single family and multifamily pathways, and program delivery and processes will remain largely the same.

The implementer noted that, due to changing federal standards, the baseline for heat pumps will increase, making that measure less cost-effective. Neither replace-on-burnout (RB) nor early replacement (ER) offerings appear to be viable options (based on cost-effectiveness); therefore, SWEPCO may adjust the program measure mix for HVAC equipment. Program staff also said they are considering new measures that are in the TRM 5.0 for REIP, such as smart thermostats and pool pumps.

SWEPCO anticipates that the launch of the Consistent Weatherization Approach in 2016 could have some effect on REIP performance, since some single family measures will be offered in both programs. However, the REIP will include single-measure prescriptive rebates, whereas the weatherization program (implemented through HPwES) will have a more holistic approach; therefore, customers not interested or unable to participate in HPwES (due to equipment failure or home ineligibility) will still be able to take advantage of incentives for certain energy-efficient measures through the REIP.

Additionally, since the Consistent Weatherization Approach will not affect multifamily properties, which are a significant portion of program savings, REIP should continue to prosper. Also, customers in single family, duplex, and triplex properties that do not qualify for the new program or are not interested in the comprehensive approach will continue to be directed to the REIP (RSOP).

2015 Performance

Consistent with results in 2012 and 2013, the RSOP's performance in 2015 was strong with respect to energy savings. After exceeding their 2014 savings target by 193%, SWEPCO increased the energy-savings goal for RSOP in 2015, from 2,668 MWh to 2,960 MWh. As shown in Table 44, the program exceeded this increased target by 40%, and SWEPCO spent only 74% of its budget.[20] SWEPCO did not meet its demand reduction target for RSOP in 2015, falling short by 37%. For the first time in three years, year-over-year demand reduction declined.[21]

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[20] The RSOP achieved 2,437 MWh of energy savings in 2012, which was 94% of goal, achieved 2,959 MWh of energy savings in 2013, or 111% of goal, and achieved 7,807 MWh in 2014, or 293% of goal.

[21] RSOP experienced a year-over-year increase in demand reduction of 19% between 2012 and 2013 to 85% between 2013 and 2014.

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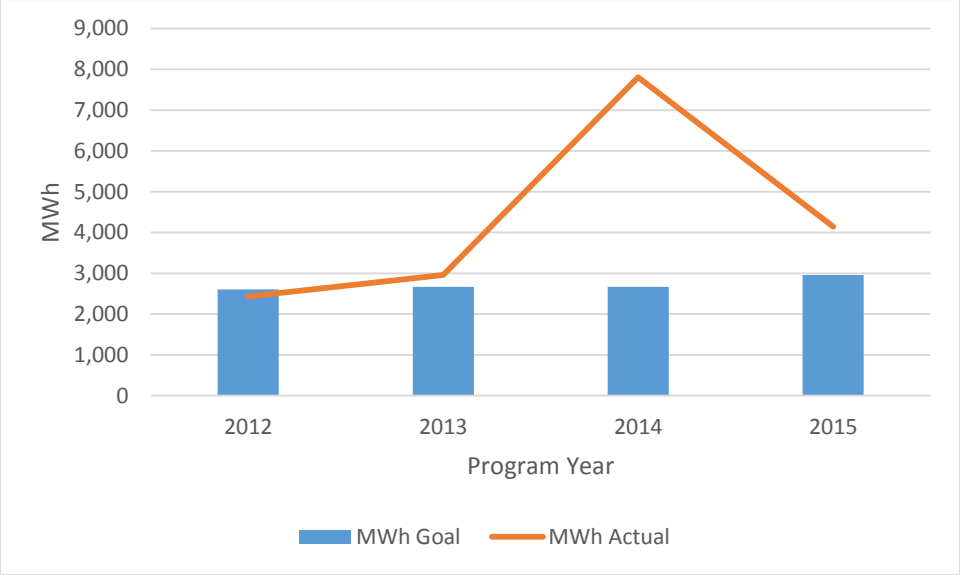
Table 44. RSOP 2015 Goals vs. Actuals

	2015 Goal	2015 Actual	Percentage of Goal	2014-2015 Percentage Change*
Energy Savings (MWh)	2,960	4,144	140%	↓ 47%
Demand Reduction (kW)	1,286	816	63%	↓ 32%
Participation (measures)	4,400	10,686	243%	↓ 39%
Budget	$1,744,518	$1,291,003	74%	↓ 20%

* Change in actual achieved results and spending from 2014.

After missing its goal by only 6% in 2012, SWEPCO has exceeded the RSOP energy savings goal each year since 2013, with 2014 being the program's most productive year by far. The addition of duct and air sealing measures to the Multifamily Direct Install Pathway in 2014 drove up participation and savings substantially that year, and some level of saturation with that measure may be a factor in why the program saw a 47% decrease in savings in 2015 compared to 2014. Figure 25 represents the RSOP annual energy savings goals and achievements from 2012 to 2015.

Figure 25. RSOP Goals vs. Actual, 2012-2015



As in prior years, the Multifamily Direct Install Pathway of RSOP provided the greatest share of energy savings (80% of the total), though it played a lesser role in achieving demand reductions (50% of the total).

As in 2014, duct sealing was the largest contributor to the program's performance in 2015, providing 75% of program energy and demand savings (compared to 64% of total program energy savings and 52% of demand reduction in 2014). Air infiltration was the second largest contributor to RSOP energy savings

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(at 17%). In 2015, ceiling insulation was not as big of a contributor to total RSOP savings as in previous years (2.8% compared to 9.2% in 2014).

Approach

Table 45 lists the EM&V activities the Cadmus Team performed for the RSOP in 2015.

Table 45. 2015 RSOP Analysis Activities

Impact Evaluation	NTG	Condensed Process Evaluation
• Database and document review • Engineering desk review • Ride-Along Site Visit • TRM deemed savings calculation review	• Blended weighted average of 2012 and 2013 values (0.89)	• Year-end interviews - Utility Program Manager (n=1) - Implementation Manager & Team (n=3)

Below, we provide specific information regarding the Cadmus Team's research and analyses that are unique to the RSOP. Appendix A provides detailed descriptions of Cadmus' general research and analytical methods.

Impact Evaluation Approach

The Cadmus Team conducted an impact analysis in conformance with the guidelines provided in the TRM 5.0. Specific impact evaluation activities are described below.

Database and Document Review

To inform the 2015 impact and process evaluations, the Team reviewed the following materials:

- 2015 program manual
- 2015 program participation database

Engineering Desk Review and TRM Deemed Savings Calculation Review

The Team calculated savings for each program measure using the algorithms and parameter definitions provided in TRM 5.0 and, where inputs needed for calculations were not available, using TRM 4.0.

Ride-Along Multifamily Site Visits

In September 2015, Cadmus shadowed four multifamily duct and air sealing contractors to view their installation practices. We observed testing elements including blower door tests and duct depressurization, as well as the installation of duct sealing, return chase sealing, and weather stripping measures.

NTG Evaluation Approach

The Team developed NTG values for both participation pathways based on primary research conducted in 2012 and 2013. The NTG results for both pathways in each program year were relatively stable. We applied each pathway's blended 2012 and 2013 NTG estimate to its gross savings in 2014 and assigned the same value in 2015.

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The final program NTG is based on a combined, savings-weighted value that reflects the relative savings of the two participation pathways.

Process Evaluation Approach

In accordance with TRM 5.0 Protocol C and the approved 2015 EM&V Plan, the Cadmus Team conducted a *condensed* process evaluation of RSOP in 2015. The Team evaluated year-over-year trends and determined that the program has achieved reasonable growth (commensurate with expectations) in each year of delivery and achieved its savings targets in each of the two previous program years.[22] As a result, the Cadmus Team determined that a condensed process evaluation was appropriate for RSOP.

Program Staff and Implementer Interviews

The Cadmus Team conducted year-end interviews with the RSOP utility and implementation managers. We focused these interviews primarily on the program performance for the year, activities to address previously identified recommendations, and plans for the program in SWEPCO's future program cycles.

Evaluation Findings

Impact Evaluation Results

The following sections present the findings from each impact evaluation activity.

Database and Document Review

The Cadmus Team inspected the program database for completeness and accuracy. The Team selected a sample of measures to review, and compared data provided in the program database to the values required for savings calculation according to TRM 5.0. We concluded that the database contains all information necessary to follow program rules and to calculate savings for all measures.

Ride-Along Multifamily Site Visit Findings

Envelope and Duct Leakage Testing

During the ride-alongs with field technicians, Cadmus witnessed quality testing procedures and implementation and does not have concerns over the validity of pre- and post-CFM readings, which are the primary drivers of savings calculations in the TRM. All four of the contractors the Team observed in the field used an envelope and duct leakage testing methodology that complies with BPI standards. Each began with a pretest to observe envelope air leakage as well as duct leakage. To test envelope leakage, the contractors began by capturing baseline conditions for approximately 10 seconds. Following that, they prepared the fan for a depressurization test, slowly raising the fan pressure to 50 Pascals and stopping when the gauge was consistently within 1-0.5 of the target Pascals.

[22] According to the TRM 4.0 Protocol C, a process evaluation is triggered when program performance was "lower or slower than expected."

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All contractors used the *leakage to outside* method to measure duct leakage. This involved pressurizing the home to 25 Pascals while depressurizing the ducts until the pressure difference between the house and the ducts measured 0 Pascals. There were no testing discrepancies, and the contractors documented CFM and the pre- and post-measurements for duct and envelope leakage.

Installation of Sealing Measures

In order to reduce leakage, Cadmus observed contractors perform necessary duct sealing, as well as sealing the return chase from the inside and from the attic space and register boots. Many also installed weather stripping on the front doors and window seals, and one also sealed around ceiling light fixtures.

While our observations indicate contractors are conscientious and thorough, their testing and sealing methods presents a potential for double counting savings when they seal both the ducts and envelope in the same home. The equations in the TRM for air and duct sealing are for separate measures and do not account for interactive effects. Because the contractors use the Leakage to the Outside standard for measuring duct leakage, sealing the envelope contributes to reduced duct leakage. As the envelope becomes tighter and restricts air flow through the penetrations, the testing result for ducts may also decrease. Additionally, in all of the units tested, the majority of leakage for both the ducts and the envelope was found in the return chase. Therefore sealing the return chase greatly reduced the leakage for both the envelope and the ducts.

TRM Deemed Savings Calculation Review

The Team evaluated the census of RSOP projects completed in 2015. The total *ex post* gross savings for the RSOP was 4,676 MWh, with a demand reduction of 996 kW. Table 46 and Table 47 show the final *ex ante* and *ex post* gross energy savings and demand reduction estimates, respectively, along with realization rates.

Table 46. RSOP *Ex Ante* and *Ex Post* Gross Energy Savings

Measure (TRM Measure Number)	*Ex Ante* Gross Energy Savings (MWh)	*Ex Post* Gross Energy Savings (MWh)	Realization Rate
ENERGY STAR Windows (TRM 5.0, 2.2.7)	32.3	32.3	100%
CFL (TRM 5.0, 2.5.1.1)	0.3	0.3	100%
Advanced Power Strips (TRM 5.0, 2.4.4)	84.7	84.7	100%
Pipe Wrap (TRM 5.0, 2.3.3)	<0.1	< 0.1	101%
Showerhead (TRM 5.0, 2.3.5)	0.6	0.6	100%
Central AC Replacement (TRM 4.0, 2.1.6)	77.2	77.2	100%
Ceiling Insulation (TRM 5.0, 2.2.2)	115.9	115.4	100%
Air Infiltration (TRM 5.0, 2.2.9)	137.5	137.5	100%
Heat Pump Replacement (TRM 4.0, 2.1.8)	30.2	30.2	100%
Wall Insulation (TRM 5.0, 2.2.3)	0.5	0.5	100%
Duct Improvement (TRM 5.0, 2.1.11)	450.3	452	100%
Rebate Total	**930**	**931**	**100%**

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Measure (TRM Measure Number)	*Ex Ante* Gross Energy Savings (MWh)	*Ex Post* Gross Energy Savings (MWh)	Realization Rate
CFL (MF) (TRM 5.0, 2.5.1.1)	116.5	116.5	100%
Faucet Aerator (MF) (TRM 5.0, 2.3.4)	39.8	39.8	100%
Pipe Wrap (MF) (TRM 5.0, 2.3.3)	0.1	0.1	101%
Showerhead (MF) (TRM 5.0, 2.3.5)	64.4	64.4	100%
Central AC Replacement (TRM 4.0, 2.1.6)	87.0	87.0	100%
Advanced Power Strips (MF)	42.5	42.5	100%
Air Infiltration (MF) (TRM 5.0, 2.2.9)	575.4	575.4	100%
Duct Improvement (MF) (TRM 5.0, 2.1.11)	2,820.0	2,820.0	100%
Multifamily Direct Install Total	**3,746**	**3,746**	**100%**
RSOP Grand Total	**4,675**	**4,676**	**100%**

Table 47. RSOP *Ex Ante* and *Ex Post* Gross Demand Reduction

Measure (TRM Measure Number)	*Ex Ante* Gross Demand Reduction (kW)	*Ex Post* Gross Demand Reduction (kW)	Realization Rate
ENERGY STAR Windows (TRM 5.0, 2.2.7)	18.2	18.2	100%
CFL (TRM 5.0, 2.5.1.1)	0.1	0.1	100%
Advanced Power Strips (TRM 5.0, 2.4.4)	9.6	9.6	100%
Pipe Wrap (TRM 5.0, 2.3.3)	<0.1	<0.1	100%
Showerhead (TRM 5.0, 2.3.5)	0.1	0.1	100%
Central AC Replacement (TRM 4.0, 2.1.6)	43.3	43.3	100%
Ceiling Insulation (TRM 5.0, 2.2.2)	78.3	91.0	116%
Air Infiltration (TRM 5.0, 2.2.9)	69.7	69.6	100%
Heat Pump Replacement (TRM 4.0, 2.1.8)	5.4	5.4	100%
Wall Insulation (TRM 5.0, 2.2.3)	0.4	0.4	100%
Duct Improvement (TRM 5.0, 2.1.11)	262.0	263.6	101%
Rebate Total	**487**	**501**	**103%**
CFL (MF) (TRM 5.0, 2.5.1.1)	21.3	21.3	100%
Faucet Aerator (MF) (TRM 5.0, 2.3.4)	4.1	4.1	100%
Pipe Wrap (MF) (TRM 5.0, 2.3.3)	<0.1	<0.1	101%
Showerhead (MF) (TRM 5.0, 2.3.5)	6.7	6.7	100%
Central AC Replacement (TRM 4.0, 2.1.6)	32.9	32.9	100%
Advanced Power Strips (MF)	4.9	4.9	100%
Air Infiltration (MF) (TRM 5.0, 2.2.9)	51.6	51.6	100%
Duct Improvement (MF) (TRM 5.0, 2.1.11)	372.8	327.8	100%
Multifamily Direct Install Total	**494**	**494**	**100%**
RSOP Grand Total	**981**	**996**	**101%**

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Rebate Channel

The measures deployed through the rebate channel received high realization rates; however, Cadmus' analysis resulted in several savings adjustments, as noted below:

- Duct Improvement –An adjustment to note (though it did not adversely affect realization rates) is that TRM 5.0 listed two HDD values in the look-up table for weather zone 9. Both the implementer and Cadmus used an average of the two values for units within weather zone 9.
- Ceiling Insulation – The Team calculated savings that resulted in 100% realization rates for all but two records for energy savings and all but 32 records for demand reduction. We found two issues with the ceiling insulation measure. First, the implementer used a conservative post-retrofit R-value of 38 for two projects where the actual R-value was higher, while Cadmus used the actual R-value. The second issue stemmed from evaluation tracking dataset errors that affected 32 of the demand reduction calculations.
- Heat Pump Replacement – For this measure, the implementer and Cadmus used TRM 4.0 for both the *ex ante* and *ex post* savings analysis to achieve 100% realization rates. The current federal minimum standard became effective January 1, 2015. Since the effective date is before July 1, this standard is not enforced until the end of the current program year (after December 31, 2015) and therefore does not affect savings calculations for the 2015 program year.
- Central AC Replacement – Both the implementer and Cadmus had to adjust the tonnage of one central AC unit. The TRM 5.0 provides look-up tables based on weather zone, capacity, and SEER range values to calculate energy savings and demand reduction. However, the capacity look-up table only provides values for whole and half ton units. One measure listed a tonnage of 2.25 in the tracking that was confirmed by the implementer to be correct on the rebate paperwork. In order to match the TRM look-up table and produce a savings value, the implementer and Cadmus used a conservative value of 2 tons to calculate savings. This adjustment had a minor impact on savings for this one measure; however, the measure overall achieved a 100% realization rate for both energy savings and demand reduction.

Multifamily Direct Install Channel

The Cadmus Team's analysis resulted in 100% energy savings and demand reduction realization rates for the measures installed through the Multifamily Direct Install Pathway; however, we noted the following explanations on the analysis:

- Central AC Replacement – For this measure, the implementer and Cadmus used TRM 4.0 for both the *ex ante* and *ex post* savings analysis to achieve 100% realization rates. The current federal minimum standard became effective January 1, 2015. Since the effective date is before July 1, this standard is not enforced until the end of the current program year (after December 31, 2015), and therefore does not affect savings calculations for the 2015 program year.
- Duct Improvement – As with the duct improvement analysis in the regular rebate channel, TRM 5.0 listed two HDD values in the look-up table for weather zone 9. Both the implementer and

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Cadmus used an average of the two values for units within weather zone 9, which resulted in realization rates of 100%.

The Team identified a few instances of incorrect data inputs in the database, but the implementer quickly responded to our inquiry and provided either an explanation or a corrected value.

Evaluated Gross Demand Reduction and Energy Savings

The Cadmus Team estimated *ex post* gross energy savings of 4,676 MWh, which resulted in a realization rate of 100% (see Table 48).

Table 48. RSOP *Ex Ante* and *Ex Post* Gross Energy Savings

Ex Ante Gross Energy Savings (MWh)	*Ex Post* Gross Energy Savings (MWh)	Realization Rate
4,675	4,676	100%

The Team estimated *ex post* gross demand reduction of 996 kW, which resulted in a realization rate of 101% (see Table 49).

Table 49. RSOP *Ex Ante* and *Ex Post* Gross Demand Reduction

Ex Ante Gross Demand Reduction (kW)	*Ex Post* Gross Demand Reduction (kW)	Realization Rate
981	996	101%

NTG Results

In 2014, the Cadmus Team used a blended NTG ratio based on 2012 and 2013 values for both participation pathways. The 2015 evaluation is retaining this method. For the multifamily pathway, the two NTG values were 90% and 96% in 2012 and 2013, respectively, which resulted in a blended average NTG of 93%. The rebate pathway resulted in NTG values of 77% in 2012 and 64% in 2013, or a blended NTG of 71%. Table 50 shows the final savings-weighted NTG values for the RSOP.

There are two NTGs for this program because the proportions of energy savings and demand reduction for both pathways differed. The multifamily pathway produced a large share of the energy savings, and we applied the multifamily NTG value of 93%. Conversely, the rebate pathway produced a proportionally large demand reduction but was subjected to the lower 71% NTG. This results in the energy savings NTG having a weighted average of 89%, compared to the demand reduction NTG weighted average of 82%. The final *ex post* net energy savings is 4,144 MWh and demand reduction is 816 kW.

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Table 50. Evaluated Net Savings

Metric	Pathway	*Ex Post* Gross	*Ex Post* Net	NTG
Energy Savings (MWh)	Rebate	931	661	71%
	Multifamily	3,746	3,483	93%
	Combined	**4,676**	**4,144**	**89%**
Demand Reduction (kW)	Rebate	501	356	71%
	Multifamily	494	460	93%
	Combined	**996**	**816**	**82%**

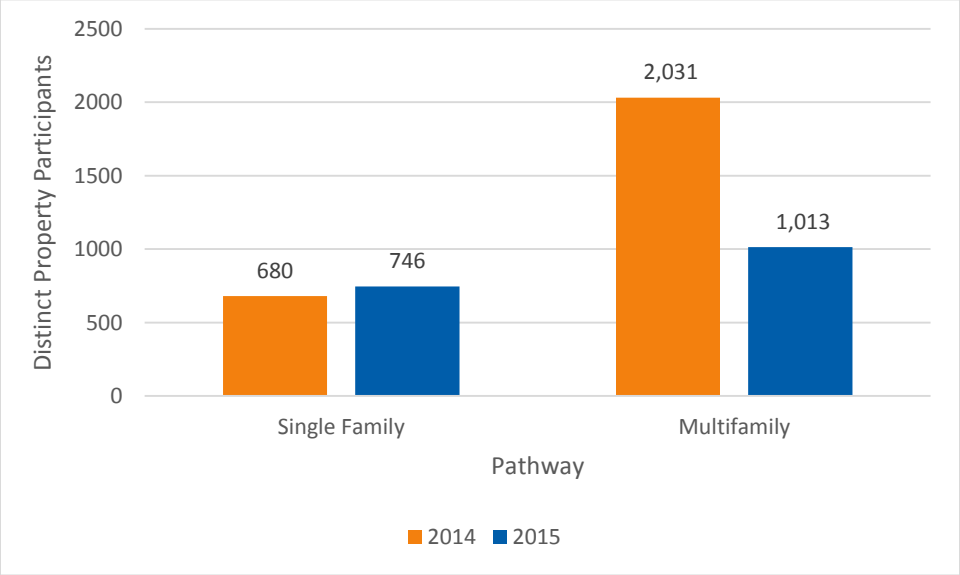
Process Evaluation Summary

As noted above, the Cadmus Team conducted a condensed process evaluation in 2015. As such, our data collection activities were limited to year-end interviews with the RSOP program and implementation managers.

Program Performance

In 2014, the RSOP experienced exponentially higher savings than it had in prior years, but, as was shown in Figure 25, program savings declined by 46% from 2014 to 2015. As noted previously, the introduction of duct and air sealing to the Multifamily Direct Install Pathway may have contributed to the much higher savings and participation in 2014. As shown in Figure 26, participation among multifamily properties in 2014 was more than double that of 2015. SWEPCO reported that they implemented new control measures in 2015 to prevent overselling by contractors and to assist contractors' transition to the statewide Consistent Weatherization Approach in 2016, which may have contributed to the decline in multifamily participation.

Figure 26. RSOP Pathway Participation, 2014 and 2015



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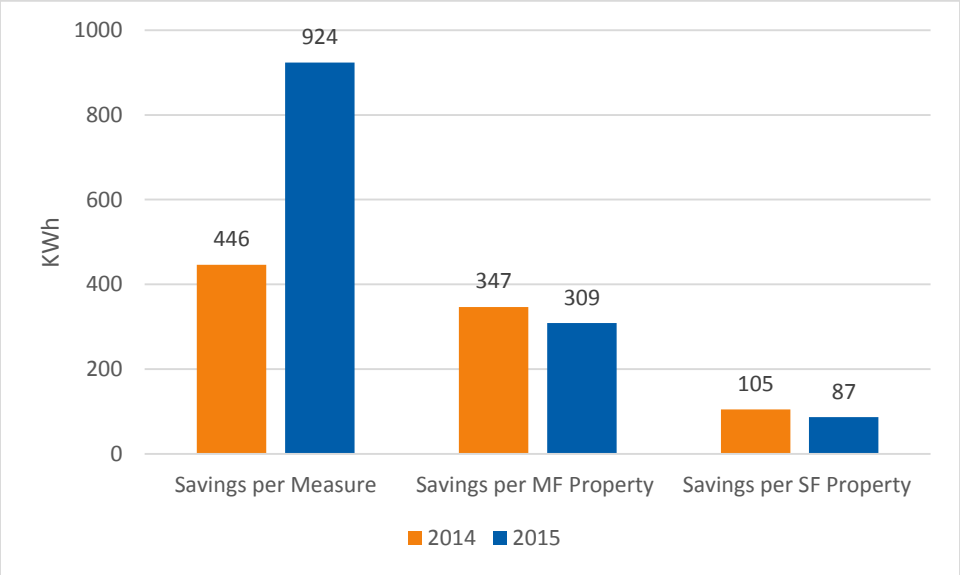
Program staff made efforts to interact more with customers in 2015 to promote measures that offer higher savings and to achieve deeper savings per participant. These efforts included conducting in-field mentoring with contractors and offering training sessions focused on the customer experience for both pathways. To support the latter goal, the implementation team took over the majority of customer engagement activities, which allowed them to evaluate program eligibility and identify the best mix of measures for each property. Program staff helped contractors' schedule their time and manage customer expectations about the site visit. This extra layer of property qualification allowed SWEPCO to help contractors' assess each property comprehensively and look for deeper savings opportunities. As shown in Figure 27, they were successful in installing more measures with higher savings per measure in 2015 compared to 2014; however, savings per unique customer home declined by 17% for the single-family pathway and by 11% for the Multifamily Direct Install Pathway in 2015 compared to 2014.

Figure 27. Net Savings per Participant Type, 2014 and 2015



As shown in Figure 28, the number of 2015 project installs peaked in January, and the program experienced more consistent participation throughout the rest of the year compared to previous years. Program and implementation staff reported that striving to achieve deeper savings at each property in favor of speedy project completion contributed to the more consistent project pipeline in 2015.

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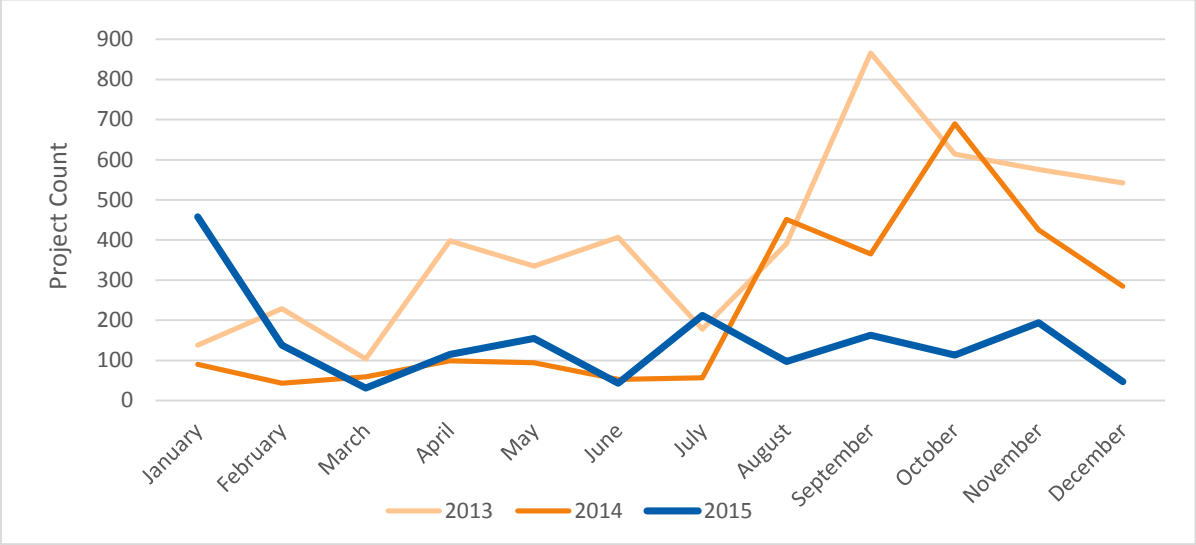
Figure 28. Monthly Project Count (2013-2015)



Customer Outreach and Marketing

The implementer's increased level of engagement with customers before and during project installation not only helped them identify deeper savings measures, it also improved customer satisfaction. SWEPCO noted that customers generally provided positive feedback regarding the program's availability, and especially liked seeing the reductions in their energy bills following participation, particularly during periods with extreme weather events. Other marketing efforts for RSOP largely remained consistent with those in previous years, including SWEPCO implementing quarterly ad campaigns for all programs at the residential and commercial levels. In early 2015, SWEPCO program staff also revised the SWEPCO gridsmart.com website to align its look and feel with the SWEPCO website, where the residential energy efficiency programs are described.

In 2015, SWEPCO ran a limited-time offer jointly with the RLP, during which customers could order a $10.00 kit through SWEPCO's online store. Kits included CFLs, LEDs, and one advanced power strip. Each customer was eligible for two kits, although program staff reported that most customers only requested one. SWEPCO sent an email announcing the kit offering on a Monday at 6:00 a.m., and by 10:00 a.m., all 500 kits were sold out. RSOP claimed the savings from the power strips while RLP claimed the savings from the CFLs and LEDs. While SWEPCO anticipates offering similar limited time promotions in 2016, they expect to attribute power strip savings to other programs, and thus they will not affect RSOP/REIP.

Trade Ally Outreach, Management, and Training

Contractor eligibility requirements in 2015 remained the same as in previous years. Contractors must maintain the appropriate state certifications and insurance, sign the participant contractor agreement, and if they are a whole-house contractor, attain BPI or RESNET certification. In conjunction with assigning marketing and outreach responsibilities to the implementation team, program and implementation staff reported changing the way they work with contractors in 2015. For the Multifamily pathway, the implementer shifted the program outreach responsibilities from contractors to

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implementation staff and conducted an overhaul of the active contractors list. This change enabled program staff to pre-screen properties, conduct blower door and duct blaster testing, and identify cost-effective projects before the contractor became involved. It also gave SWEPCO greater control over the program pace, and ensured the best projects were installed for the property and for the program.

SWEPCO also overhauled the contractor list to only include contractors actively installing projects. Previously, contractors were not required to reapply to participate in the program, which made it difficult to identify and target those that were still actively participating. In 2015, SWEPCO asked all contractors to reapply; without the inactive contractors (who were still welcome to re-apply at a later date if they chose) the list of participating contractors tightened from 125 to 62.

In 2015, SWEPCO hosted a kickoff meeting in December and offered three training sessions for contractors throughout the year. Topics included customer experience, installation best practices, and overall industry best practices. In addition to directly offering trade ally training sessions, SWEPCO provided several scholarships to allow contractors to attend ACI (Affordable Comfort, Inc.) home performance conferences in 2015.

Progress on Implementation of Recommendations

Table 51 lists the status of the 2014 recommendations for the RSOP. As shown, SWEPCO has addressed one of the three program recommendations from 2014. Due to the bridge year in 2016, SWEPCO will consider realigning its program goals in conjunction with planning for the 2017-2019 program cycle. The recommendation that remains partially completed is outside SWEPCO's control. One recommendation from 2013 also remains incomplete. SWEPCO may consider the remaining 2013 and 2014 recommendations while developing its 2017-2019 Energy Efficiency Plan filing.

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Table 51. Status of 2013 and 2014 RSOP Recommendations

Year	Recommendation	2014 Status
2013	Consider a metering study to better inform faucet aerator and showerhead use, especially within the multifamily sector.	***Partial/In Progress.*** SWEPCO will consider incorporating a metering study into a future M&V plan.
2014	Update the TRM 4.0 to include the maximum pre-installation leakage rate in the corresponding equation.	***In Progress/Partial:*** The TRM was updated to include a higher maximum pre-installation leakage rate of 40% (from 35%), but the corresponding equation was not updated.
2014	Target higher demand reduction measures for the program, such as ceiling insulation, central AC replacement, and heat pump replacement.	***Completed:*** SWEPCO added an additional top-tier bonus incentive for RSOP contractors who reached the top tier for both duct and air sealing.
2014	Better align demand reduction goals with program performance and energy savings in the 2017-2019 program filing.	***In Progress/Partial:*** Staff consider 2016 a bridge year, due to policy changes being implemented, and made only minor changes to 2016 program goals. SWEPCO will re-evaluate goals for the 2017-2019 program filing.

2015 Conclusions and Recommendations

The RSOP performed well overall in 2015, exceeding its new, higher savings goal while staying well within budget. However, the program fell short of demand reduction goals, at two thirds of target, which is consistent with previous years.

Conclusion: The new statewide Consistent Weatherization Approach will offer overlapping measures with the RSOP/REIP, and therefore could negatively impact the program's ability to continue achieving the levels of savings and participation compared to prior years. However, through the REIP, SWEPCO will continue to provide opportunities for participants who are ineligible for (e.g., multifamily properties) or uninterested in HPwES.

Recommendation: Consider the potential effects of the Consistent Weatherization Approach on the RSOP/REIP in developing program budgets and targets for the 2017-2019 Energy Efficiency Plan. Going forward, be prepared to adjust savings targets and/or find ways to differentiate the REIP with new measures and services, or increase participation among under-represented populations in order to retain a consistent level of savings impacts if needed.

Recommendation: Consider updating RSOP/REIP marketing materials to clearly define the program offering and differences with the statewide Consistent Weatherization Approach to ensure customers, trade allies, and customer service staff understand how to identify which program offers the pathway that best meets their needs.

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Conclusion: SWEPCO has changed the RSOP since the Team's last process evaluation in 2013, and will likely make additional changes in 2016. Specifically, SWEPCO has modified the program measure and incentive offerings, marketing and outreach tactics, and trade ally recruitment and training approach. Additionally, changing federal standards may render some measures (including heat pumps) no longer cost-effective next year, and the launch of the statewide Consistent Weatherization Approach in 2016 is likely to drive additional program modifications.

Recommendation: Consider conducting a full process evaluation in 2016. Having gone through several program changes since the last comprehensive evaluation, RSOP/REIP would benefit from capturing customer and contractor feedback. A customer survey would allow SWEPCO to evaluate changes in customer awareness and how customers learn about the program, but also why they choose REIP over HPwES. This type of market intelligence can be valuable to help design effective marketing and outreach strategies. Contractor surveys could help SWEPCO verify that training sessions are meeting trade ally needs and identify new training topics that would benefit contractors. The program could also benefit from a process benchmarking evaluation to identify potential new measures that would be cost-effective, supplement potential lost savings due to the Consistent Weatherization Approach, and meet SWEPCO customers' needs.

Conclusion: From on-site observations with four multifamily direct install duct and air sealing contractors, Cadmus observed that the methodology and results of pre- and post-CFM readings are valid. However, there is a potential for double counting of savings due to sealing both the ducts and envelope in the same home. The equations in the TRM are for separate measures and do not account for interactive effects.

Recommendation: Consider studying the interactive effects of installing both duct and air sealing measures in the same home. The results may indicate an adjustment is needed in the Arkansas TRM for those measures.

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Small Business Direct Install Program

Program Overview

SWEPCO originally launched the SBDI Program in 2011, and has made modest changes since. Through the SBDI program, SWEPCO offers incentives to customers for measures such as lighting, HVAC, and refrigeration controls. SWEPCO either pays incentives to participating trade allies, who install projects and deduct the incentive amount from their customers' invoices, or pays incentives to the implementer, who installs certain measures directly at no cost to the customer. CLEAResult implements the SBDI Program.

Customer Requirements

With the SBDI Program, SWEPCO targets small businesses with:

- Peak demand less than or equal to 50 kW
- Annual electricity consumption below 200,000 kWh

2015 and Future Program Changes

In 2015, SWEPCO launched HVAC tune-ups for the first time as a new program component for small business customers. Although no SBDI customers received an HVAC tune-up in 2015, program staff reported that many property management firms, contractors, and business owners expressed interest in pursuing CoolSaver HVAC tune-up incentives in 2016. In addition, SWEPCO updated the Open tool application to add building type, new eligible measures, and updated measures in accordance with the TRM 5.0; correct incandescent wattages; and added a refresh button to improve performance.

CLEAResult assumed responsibility for all program implementation tasks in 2015:

- Marketing and cross-promotion (with CIEEP)
- Direct installations
- Water measure installations
- Trade ally recruitment
- Reporting and auditing tool implementation (Open tool™)
- Project proposal reviews
- Pre- and post-installation inspections
- QA/QC
- Savings and data tracking
- General administration/oversight

After broadening the diversity of SBDI Program measures (adding HVAC replacement and lighting controls) in 2014, in 2015 SWEPCO recruited additional trade allies with specialties other than lighting, offering them trainings focused on comprehensive project installations. CLEAResult led numerous measure-specific trainings on program offerings, such as custom lighting and electrical equipment.

In 2016, the baselines for commercial lighting will change as a result of EISA legislation. This change will likely affect the program offering for lighting. SWEPCO plans to revisit the program design when filing their 2017-2019 program plans. The implementation team is also considering adding more refrigeration measures to the program in 2016.

2015 Performance

In 2015, the SBDI Program exceeded its savings goal of 4,800 MWh by 8% (see Table 52). The program achieved steady growth in both savings and participation relative to 2014. The program expanded in

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2015 as a result of staff and budget increases during 2014 and efforts to reach previously underserved communities. As a result, SBDI exceeded its 2015 participation goal by 9% after falling short by 20% in 2014. Demand reduction exceeded the 2015 goal by 75%, increasing 11% over 2014. The program spending exceeded budget by 4%, a 6% increase from 2014. Table 52 shows a summary of the SBDI Program achievements for 2015.

Table 52. SBDI Program 2015 Goals vs. Actuals

	2015 Goal	2015 Actual	Percentage of Goal Achieved	2014-2015 Percentage Change*
Net Energy Savings (MWh)	4,800	5,170	108%	↑ 24%
Net Demand Reduction (kW)	500	877	175%	↑ 11%
Participation (projects)	260	283	109%	↑ 12%
Budget	$1,081,432	$1,123,735	104%	↑6%

* Change in actual achieved results and spending from 2014.

The SBDI Program continued its four-year expansion trend in 2015, gaining new participants and increasing energy savings. SWEPCO entered 2015 with a healthy SBDI project pipeline due to program success in 2014. In December 2014, staff requested that trade allies delay projects until 2015 because of expectations that the total portfolio would exceed 2014 goals by a sizeable margin. This allowed SWEPCO to manage program performance in 2015 and build a pipeline of projects to support achievement of its 2016 goals.

Figure 29 shows the monthly energy savings and demand reduction over the course of the 2015 program year.

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Figure 29. 2015 SBDI Program *Ex Ante* Energy Savings and Demand Reduction by Month

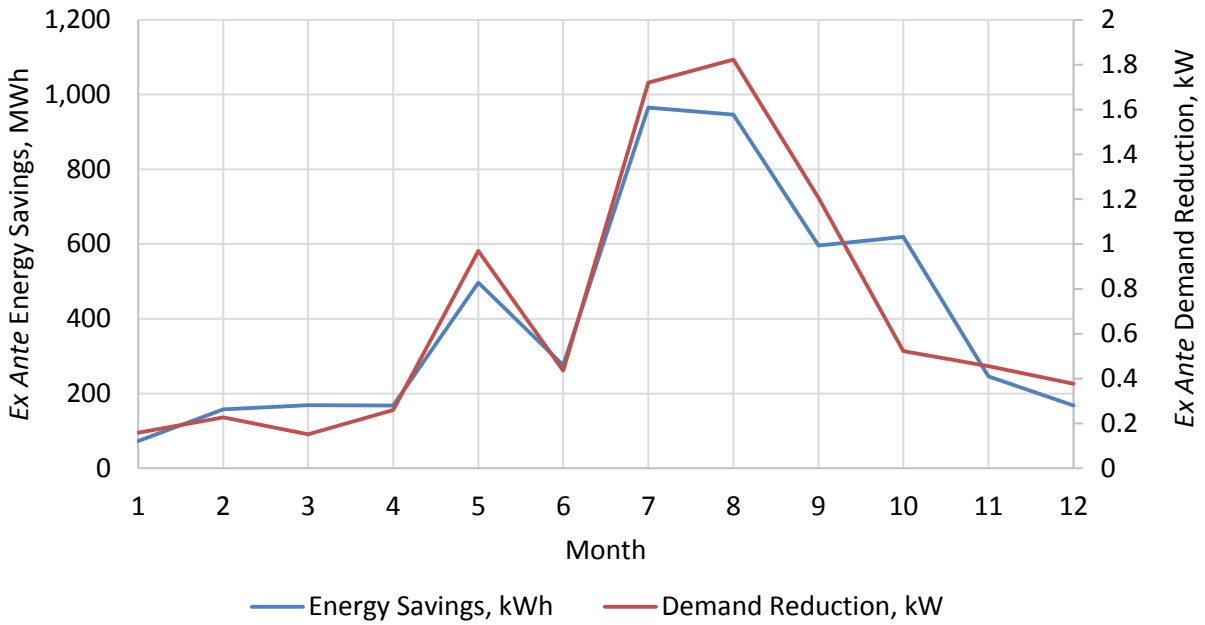
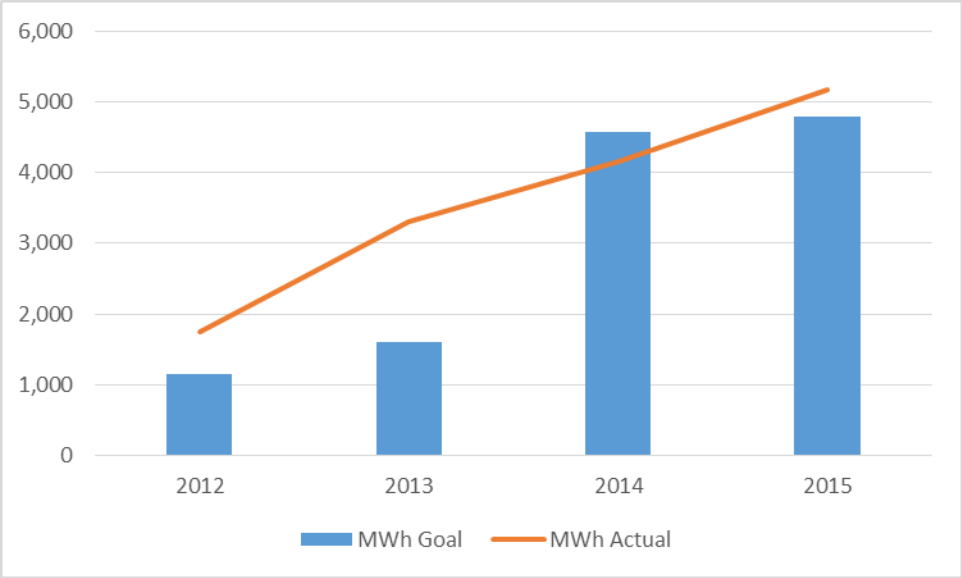


Figure 30 represents the SBDI Program annual energy savings goals and achievements from 2012 to 2015.

Figure 30. Small Business Direct Install Program Goals vs. Actual, 2012-2015



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Approach

In 2015, the Cadmus Team conducted impact evaluation activities mid-year and at year end. In the mid-year data review, SWEPCO submitted data via secure file transfer portal for rebates distributed from January 1 to July 1, 2015. The Team reviewed the data for errors or omissions, and provided SWEPCO with a memo summarizing the results of our review and identifying items that we needed to complete the final data analysis at the close of the program year.

Table 53 lists the EM&V activities the Cadmus Team performed for the SBDI Program in 2015.

Table 53. 2015 SBDI Program Analysis Activities

Impact Evaluation	NTG	Condensed Process Evaluation
• Database and document review • Engineering desk review • TRM deemed savings calculation review	• Blended weighted average of 2012 and 2013 values (1.05)	• Year-end interviews ▪ Utility Program Manager (n=1) ▪ Implementer Manager (n=1) • Trade ally interviews (n=5)

Below, we provide specific information regarding the Cadmus Team's research and analyses that are unique to the SBDI Program. Appendix A provides detailed descriptions of Cadmus' general research and analytical methods.

Impact Evaluation Approach

The Cadmus Team conducted two rounds of impact analysis in conformance with the guidelines provided in the TRM 5.0. We performed a preliminary analysis in September 2015 to identify potential issues and/or missing data needed to complete the impact analysis. Then we sent an additional data request to SWEPCO in October 2015 for the following information:

- Lighting control applications, which must include total controlled fixture wattage.
- Lighting fixture applications, which must include location designation (indoor or outdoor) to calculate peak demand reduction.

The implementer updated the year-end data delivered to Cadmus to include the requested data points. The Team performed a year-end impact analysis in January 2016. Specific impact evaluation activities are described below.

Database and Document Review

To inform the 2015 impact and process evaluations, the Cadmus Team reviewed the following materials:

- Monthly reports
- Program manual
- Program marketing materials
- Program tracking data

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Engineering Desk Review and TRM Deemed Savings Calculation Review

The Team reviewed the implementer's calculation of *ex ante* savings to ensure accuracy and consistency.

TRM Deemed Savings Calculation Review

The Team compared the deemed savings values and algorithms in TRM 5.0 to the values used by the program implementer to calculate measure savings and to verify they had been applied accurately and consistently. The Cadmus Team compared the deemed savings values and algorithms in TRM 5.0 to the values used by the program implementer to calculate measure savings and to verify they had been applied accurately and consistently. When appropriate, the Team updated inputs and methods in the program savings database to align with the TRM 5.0.

NTG Evaluation Approach

The Team conducted primary data collection and analysis in 2012 and 2013 for the SBDI Program. Therefore, in both 2014 and 2015, we blended the 2012 and 2013 NTG ratios and calculated a straight average value to apply to *ex post* gross savings.

Process Evaluation Approach

In accordance with TRM 5.0 Protocol C and the SWEPCO approved 2015 EM&V Plan, the Cadmus Team conducted a *condensed* process evaluation of the SBDI Program in 2015. This approach is appropriate because SBDI has experienced consistent maturation and growth since inception and had no significant problems with operations, implementation, or customer response. However, due to concerns raised by trade allies in the 2014 evaluation regarding the Open tool, Cadmus conducted a limited number of follow up interviews to assess changes in trade ally experience with the tool.

Program Staff and Implementer Interviews

The Cadmus Team conducted year-end interviews with the SBDI program manager and CLEAResult implementation manager. We focused these interviews on the program performance for the year, activities to address previously identified recommendations, the Open tool, satisfaction and any upcoming program changes.

Trade Ally Interviews

The Cadmus Team interviewed five commercial-sector SBDI trade allies to investigate their experience with the Open tool application. Typically a condensed process evaluation does not include trade ally interviews however as a result of 2014 evaluation findings where several trade allies expressed concern with the tool, and the Cadmus Team determined it was prudent to follow up with trade allies for the 2015 evaluation. Our interviews covered the following topics:

- Program expectations, awareness, and satisfaction
- Experience with the new Open tool application and software
- Program parameters and rules
- Strategies for promoting program measures to customers

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Evaluation Findings

Impact Evaluation Results

In general, the Cadmus Team found that evaluated energy savings and demand reduction were very close to the reported savings. Since the lighting measures (custom lighting and lighting controls) accounted for over 92% of *ex ante* savings, adjustment to these measures drive the overall realization rates. These adjustments are described in detail below.

The following sections present the findings from each impact evaluation activity.

Database and Document Review Findings

During the mid-year review, the Cadmus Team inspected the program database for completeness and accuracy. We identified supplementary data needed to complete evaluations (custom lighting and lighting controls). For the custom lighting measures, the Team requested additional inputs to describe whether the fixtures were located indoors or outdoors. For the lighting controls measures, we requested inputs that describe the type of fixture controlled and the associated fixture wattage.

Additional findings from the database and document review are included in the TRM Deemed Savings Calculation Review Findings section below.

Engineering Desk Review Findings

The Cadmus Team reviewed the savings database and found that in most cases, SWEPCO had calculated the savings correctly. The few instances where savings were not calculated correctly are described in detail below.

TRM Deemed Savings Calculation Review Findings

The Team evaluated all completed SBDI projects. The total *ex post* gross savings for SBDI was 4,924.2 MWh, with a demand reduction of 835.6 kW. Table 54 and Table 55 show the final *ex ante* and *ex post* gross energy savings and demand reduction estimates, respectively, by measure category.

Table 54. SBDI Program *Ex Ante* and *Ex Post* Gross Energy Savings

Measure	*Ex Ante* Gross Energy Savings (MWh)	*Ex Post* Gross Energy Savings (MWh)	Realization Rate
Custom Lighting	4,456	4,497	101%
Lighting Control	39	41	104%
Anti-Sweat Heater Control	170	170	100%
Faucet Aerator	210	211	100%
Pre-Rinse Spray Valve	2	2	100%
Vending Miser	3	3	100%
Total*	**4,881**	**4,924**	**101%**

* Totals may not sum due to rounding.

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Table 55. SBDI Program *Ex Ante* and *Ex Post* Gross Demand Reduction

Measure	*Ex Ante* Gross Demand Reduction (kW)	*Ex Post* Gross Demand Reduction (kW)	Realization Rate
Custom Lighting	754.66	758.88	101%
Lighting Control	7.47	7.77	104%
Anti-Sweat Heater Control	2.23	2.27	102%
Faucet Aerator	66.07	66.32	100%
Pre-Rinse Spray Valve	0.30	0.30	100%
Vending Miser	0.06	0.06	100%
Total*	**830.78**	**835.60**	**101%**

* Totals may not sum due to rounding.

Lighting Measure Findings

After reviewing the lighting measures (custom lighting and lighting controls) in the database and comparing them with the savings calculations stipulated by TRM 5.0, the Cadmus Team noted the following minor discrepancies:

- The demand reductions provided in the database included the first two decimal places only. This affects the demand realization rates for both the custom lighting and lighting control measures because the combined effect of rounding was slightly lower reductions.
- Incorrect heating and cooling system types were submitted for one of the lighting controls applications. The building type submitted was 'Retail, Excluding Mall/Strip,' and the cooling and heating system types were 'None' and 'No Heat,' respectively. However, the *ex ante* energy savings used the 'Electric AC, Non-Electric Heat' space interactive effects factor.
- Incorrect space interactive effects were used in the *ex ante* calculations for one of the lighting controls applications. The building type submitted was 'Low Temp Refrigeration,' but the calculations used the 'No Heat, No Cooling' space interactive effects factor.
- Cadmus noted that the all of the implementer's lighting energy savings calculations accurately reflected the EISA baseline wattages.

Non-Lighting Measure Findings

After reviewing the non-lighting measures (anti-sweat heater controls, faucet aerators, pre-rinse spray valves, and vending misers) and comparing them with the savings calculations stipulated by TRM 5.0, the Cadmus Team made only one adjustment to the savings calculations, for anti-sweat heater controls. The Team found that in six of the applications, the weather zone entered in the database was different from both the site's actual weather zone and the weather zone used in SWEPCO's savings calculations. Adjusting this input resulted in energy savings and demand reduction realization rates of 100% and 101.7%, respectively.

The secondary cause of inconsistency for the anti-sweat heater control *ex post* demand reduction compared to the *ex ante* demand reduction was due to rounding. The SWEPCO database provided only

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two decimal places for anti-sweat heater control *ex ante* demand reduction. Since the TRM 5.0 deemed demand reductions (kW/foot) include four decimal places, in some cases the level of precision included in the SWEPCO database was insufficient to accurately compare to the TRM.

NTG Results

The Cadmus Team calculated a blended NTG percentage of 105% based on primary research conducted in 2012 and 2013. Applying the 1.05% NTG ratio to *ex post* gross savings results in *ex post* net energy savings of 5,170.4 MWh and demand reduction of 877.3 kW.

Table 56 presents *ex post* gross and *ex post* net savings using 105% NTG.

Table 56. SBDI Program Evaluated Net Savings

Metric	*Ex Post* Gross	*Ex Post* Net	NTG Ratio
Energy Savings (MWh)	4,924.2	5,170.4	105%
Demand Reduction (kW)	835.6	877.4	105%

Process Evaluation Summary

As noted above, the Cadmus Team conducted a condensed process evaluation in 2015. As such, our data collection was limited to year-end interviews with the SBDI program and implementation managers. In addition, we conducted combined commercial trade ally interviews in order to follow up on concerns raised by trade allies in 2014 regarding the Open tool application.

Program Performance

The SBDI Program has grown at a consistent rate since 2011, as shown in Figure 31. While many programs plateau as the market becomes more saturated, the SBDI Program has been able to achieve modest and sustained growth in 2014 and 2015. Program staff from SWEPCO and CLEAResult expressed satisfaction with the program's 2015 performance. Program and implementation staff cited new incentives and measures that increased trade ally participation, strategies for promoting the program in previously untapped regions, and improvements to trade ally communication and support as reasons for the program success. Furthermore, the SBDI Program achieved these goals with a lower cost per MWh: in 2015 the program's acquisition cost $0.215 per MWh, a 15% decrease from 2014.

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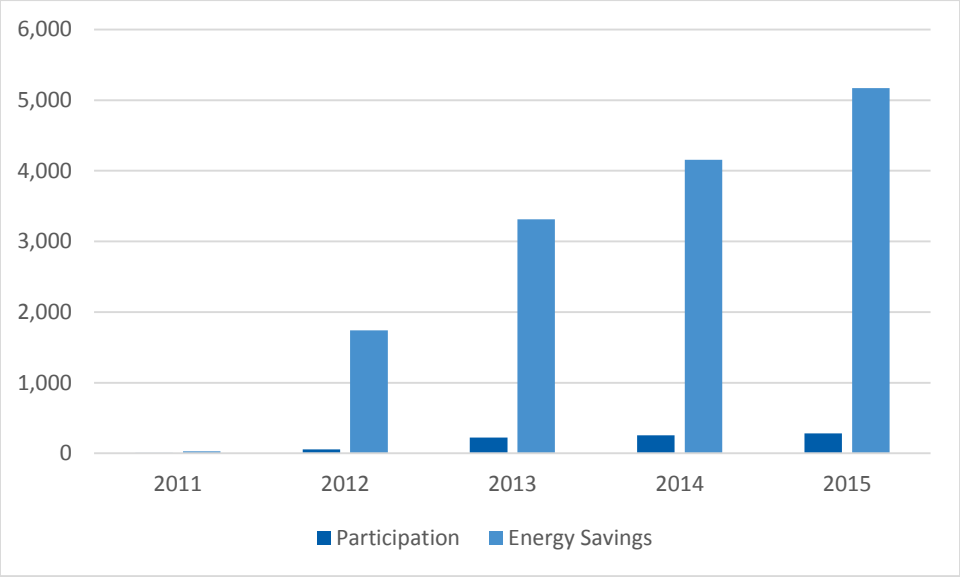
Figure 31. Participation and Energy Savings from 2011 to 2015



Customer Outreach

Staff reported confidence in their ability to continue to grow program participation because they have gained a strong knowledge of which outreach methods are most effective for the region. Word-of-mouth, events, and partnerships with trade allies and distributors were the most successful outreach tactics. While trade allies continue to be the primary and first point of contact for most customers, SWEPCO complements trade ally program promotion with emails to customers, program website updates, and one-on-one discussions.

In 2015, SWEPCO sought to increase the number of program participating trade allies and extend the SBDI Program reach across a broader territory. To accomplish this, SWEPCO focused trade ally outreach on areas underserved by the program, such as the southwestern and central parts of the state, by tapping into smaller communities. Recognizing that the trade ally network expands primarily by word-of-mouth, the implementation team encouraged participants to tell others in the business community about the program and encouraged contractors to focus their outreach efforts on population centers. Additionally, the implementer established relationships with lighting (and other measure) distributors and suppliers across SWEPCO's territory. Program and implementation staff reported that these strategies were successful in recruiting trade allies, noting an increase in trade ally interest following word-of-mouth efforts. By the end of 2015, 34 trade allies were participating in the SBDI Program, slightly more than the 32 active trade allies in 2014.

As Figure 32 indicates, the largest number of trade allies cover the northwest region of the state.

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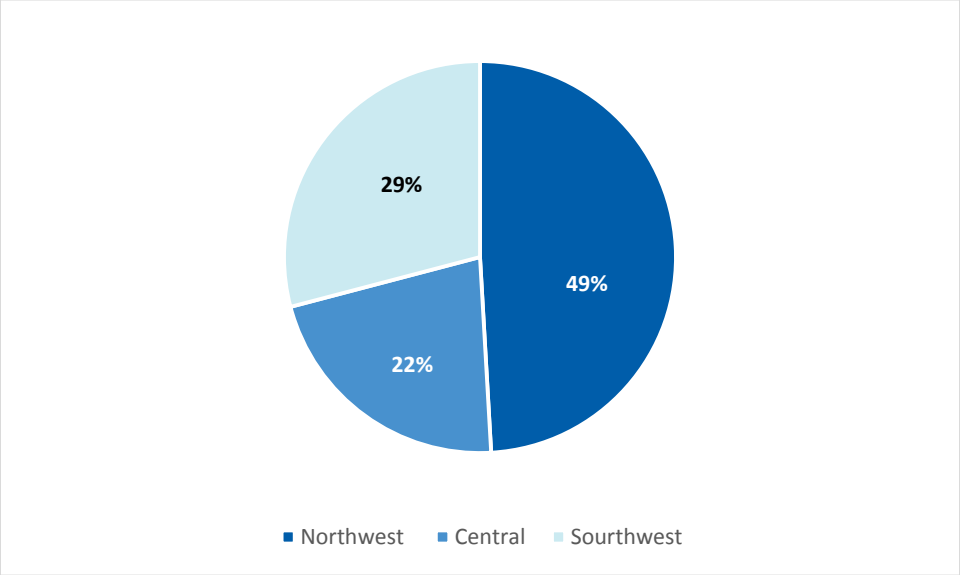
Figure 32. SBDI Program Trade Ally Representation



Source: SBDI approved trade ally list.

Periodically throughout the year, SWEPCO convenes trade allies for training and recognition. An end-of-year banquet was held to recognize the most active trade allies within the program. To keep new and existing trade allies informed about program features and benefits, program protocols, and the needs of small businesses, the implementation team organized kickoff sessions, training sessions, speaking engagements, and events to address topics such as energy efficiency sales, financing strategies, and program offerings. Program staff also issues a newsletter for trade allies informing them of program updates and holds regular lunches with trade allies to solicit program feedback and keep these contractors apprised of any program changes. Four of five surveyed trade allies had attended a training in the past year, all of whom said that the information was helpful and relevant to their businesses. One trade ally remarked that they plan on bringing more of their staff to the events and trainings, as "it [was] well done and informative."

Trade allies in general expressed positive feedback about the program and its ability to help them generate new business, citing program staff's training efforts and marketing materials as being particularly helpful.

Trade Ally Feedback on Processes and Tools

Beginning in 2014, SWEPCO introduced the Open tool, a tablet-based software platform that trade allies can use to immediately determine customer eligibility, identify multi-measure energy efficiency opportunities, and provide cost and savings estimates, thus eliminating administrative delays and repeat customer visits. Program staff explain the Open tool and related processes to all new trade allies during a short one- to two-hour training and sends out email updates about the Open tool informing trade allies of software updates and changes. The implementation team also provides Open tool technical support to trade allies who have questions or issues with the application. In 2015, CLEAResult began

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testing their latest version of the Open tool with plans to launch software enhancements in 2016. The latest version of the Open tool will include the following improvements:

1. Added building type selection on room level to capture hours of operation more accurately
2. Added building type for exit signs so they are calculating on 24/7 operating hours
3. Corrected incandescent wattages to correspond with TRM baselines
4. Added a "Refresh from Server" button on the program dashboard to improve overall tool speed and performance
5. Updated all measures in accordance with AR TRM v.5.0 including change to T8 baseline
6. Added door gaskets and strip curtains to eligible measures

In 2014, some trade allies were resistant to using Open tool since it was new, and reported finding it difficult to use. The Cadmus Team followed up on these concerns in 2015, and found that challenges persist; however, we note that at the time of our trade ally interviews, the updated tool had not yet been released. Program and implementation staff reported that trade allies' responses to Open tool have been mixed. While the tool helps with promoting measures in addition to lighting (e.g., refrigeration and water heating), it requires specific data entries that some users find inflexible and cumbersome when in the field with a customer. In 2015, four of five commercial trade allies reported having problems operating Open tool. Two trade allies mentioned that the application needs to be more flexible to enable changes quickly in the field. Another trade ally noted that the application is time-consuming to use.

All four trade allies who reported significant issues with Open tool said they work with CLEAResult regularly to resolve issues with the application. When the Team asked if additional training would be helpful, responses were mixed: two trade allies said it would be helpful and two said that problems extended beyond training. One trade ally stated that while Open tool support from local implementation staff was superb, implementation staff at the company's headquarters was less reliable and less helpful in providing the support they desired.

Two of five trade allies stated that they do not use the tool on site because it is too problematic. One of these trade allies said, "We actually take detailed notes while on site and fill out the application at our office due to the length of time it takes to use the app." The other trade ally who also mentioned not using Open tool on site said they do not want the customer to "see how frustrating and problematic it is to generate a proposal on the application." One of the two trade allies noted that for projects with multiple measures, the application is quite slow and does not respond well to input changes, making the data entry process quite lengthy. The same trade ally noted, "The fixture codes are confusing and if you make an error, you'll sometimes have to redo the whole entry for a room." However, two trade allies did mention that Open tool is useful in generating incentive estimates for customers, which enabled them to sell the program to potential participants.

Despite concerns with Open tool, trade allies expressed overwhelming satisfaction with the program overall. Four of five said they were "very satisfied" with the program and believed it helped boost their

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sales and expand their customer base. They also remarked that the local CLEAResult staff were responsive, helped them navigate program requirements, and answered their questions in a satisfactory manner. One trade ally interviewed was "not very satisfied" with the program overall, with much of their dissatisfaction relating to the Open tool application.

Pre- and Post-Inspection Processes

The pre- and post-installation inspection processes remained unchanged in 2015, but some trade allies expressed dissatisfaction with the process. Program staff reported that, as stated in the program manual, program staff perform pre- and post-inspections for each of the first five projects completed by a trade ally, then 20% of all projects installed thereafter. For all projects, a desk review is performed of program applications to verify savings and incentives. Staff noted that lighting counts are the most common area of inconsistency in projects, but this can often be remedied in a matter of days by working with the contractor.

Two trade allies, both of whom have been involved with the program for more than a year and whose work would fall under the 20% inspection threshold, expressed dissatisfaction with the program inspections processes. These trade allies expressed concern that the inspection processes were invasive for their customers, particularly if there was more than one inspection.

Program staff noted that the potential for inspections is a condition of receiving program incentives and is specifically outlined in the agreement that customers and contractors both must sign as a requirement of participation. SWEPCO's inspection protocol for the SBDI program is explained in the program manual and is consistent with QA/QC best practice.

Progress on Implementation of Recommendations

Table 57 lists the status of 2014 SBDI recommendations and two 2013 recommendations that remained pending as of the Cadmus Team's 2014 EM&V report. As shown, SWEPCO has completed one recommendation from 2013 and is in the process of completing one 2014 recommendation. SWEPCO will consider the remaining 2013 and 2014 recommendations while developing its 2017-2019 Energy Efficiency Plan filing.

Table 57. Status of 2013 and 2014 SBDI Program Recommendations

Year	Recommendation	2015 Status
2013	While integrating the SBDI-1 and SBDI-2 components, monitor trade ally and customer response and mitigate potential problems.	***Completed***. Program staff introduced training, mentoring, coaching, and ongoing monitoring to support trade allies and customers.
2013	Consider offering a bundling or tiered incentive in the next program cycle to motivate small business customers and trade allies to complete more comprehensive projects.	***In Progress/Partial***. Staff reported that it will consider new incentives for the 2017-2019 Energy Efficiency Plan filing.

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Year	Recommendation	2015 Status
2014	Follow up with trade allies to better understand their sources of dissatisfaction with the Open tool software, then address identified deficiencies as needed and feasible.	***In Progress/Partial.*** Staff held Open tool trainings with trade allies and updated the application. Staff noted this has greatly increased submission reliability and allowed for both indoor and outdoor facility types to be processed under one project. As contractors use the revised tool, staff should continue efforts to gather feedback, make improvements, and provide guidance to trade allies on the application.
2014	Identify new potential program measure offerings—either through specific target customer segmentation or a review of the Arkansas Potential Study (when released)—that have significant savings potential for small businesses and that are cost-effective.	***In Progress/Partial.*** SWEPCO added HVAC tune-ups, strip curtains, and refrigeration gaskets to the program to increase savings potential. Staff reported that they will consider additional new program offerings for the 2017-2019 Energy Efficiency Plan filing.

2015 Conclusions and Recommendations

The SBDI Program experienced continued growth in 2015; this year's growth in participation and savings was greater than in past years as a result of program maturation and a push in outreach and budget during 2014. The program has also continued to expand its offerings, such as the inclusion of the CoolSaver component, and outreach to more rural and hard-to-reach markets. Due to these factors, Cadmus expects additional growth in 2016. The program achieved high levels of satisfaction from both trade allies and staff. Additionally, the program has been able to leverage past experiences to develop a strong understanding of the needs of customers and trade allies allowing for the program to maintain satisfaction levels while expanding program participation.

Staff stated that in future years they would like to continue to see expansion in non-lighting measures and program trade allies who are active within the program. The only cause for concern stems from the ongoing issues that trade allies are experiencing with Open Tool, however, as noted above, the Open tool upgrades had not yet been launched at the time the Evaluation Team interviewed trade allies. The Team advises continued attention to this issue to ensure trade allies become more comfortable with the upgraded tool and to prevent trade ally dissolution from the program.

Conclusion: The uptake of non-lighting SBDI Program measures has been slow, partially because commercial customers continue to have demand for lighting (and smaller customers may not have many energy saving opportunities beyond lighting and HVAC) and partially because trade allies are not accustomed to selling comprehensive projects.

Recommendation: Identify specific business types that are well-suited for particular non-lighting measures and market these along with lighting measures. For example, small convenience and grocery stores that meet the program's eligibility requirements may benefit from upgrades to their refrigeration

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systems. Program efforts to emphasize training in comprehensive projects will likely contribute to an improved measure mix in the future.

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Load Management Standard Offer Program

Program Overview

Since 2008, SWEPCO has offered the Load Management Standard Offer Program (LMSOP) to C&I customers who agree to reduce their demand during curtailment events. SWEPCO notifies participating customers at least one hour prior to curtailment events via telephone, email, and/or text message, depending on each customer's preference. Events cannot exceed four hours in duration, three consecutive days, or 12 days per curtailment season, which runs each year from June 1 through September 30. Participating customers receive $20 per kW per year for contracted demand interruptions, with a demand reduction cap of 1,000 kW, and they receive $0.25 per kWh for energy savings resulting from load curtailment events.

LMSOP Customer Requirements

The LMSOP targets C&I customers with:

- Minimum peak demand of 250 kW
- Ability to curtail 250 kW for up to four hours in a day when called upon by SWEPCO

SWEPCO staff implement LMSOP, continuing to operate the program with mostly the same participating customers from years past and with no program design changes.

2015 Performance

SWEPCO called three curtailment events during 2015, the same number it called in 2014. Although LMSOP did not meet its 2015 demand reduction goal, the program exceeded its typical performance over the past three years, with demand reductions nearly meeting the 2015 goal. The program achieved 99% of its demand reduction target, 63% of its energy-savings target, and 95% of its participation target, as shown in Table 58.[23]

Table 58. LMSOP 2015 Goals vs. Actuals

	2015 Goal	2015 Actual	Percentage of Goal Achieved	2014-2015 Percentage Change**
Energy Savings (MWh)*	200	127	63%	↑ 11%
Demand Reduction (kW)*	10,000	9,868	99%	↑ 13%
Participation (meters)	20	19	95%	↓ 5%
Budget	$341,640	$283,642	83%	↑ 36%

* Energy and demand are measured at the meter.

** Change in actual achieved results and spending from 2014.

As in previous years, the program did not meet its goals for two primary reasons: (1) the original plan projections are misaligned with the number of potentially eligible participants, and (2) program eligibility criteria limits participation. SWEPCO plans to consider the Cadmus team's recommendations

[23] In 2014, SWEPCO updated participant units to be based on the number of meters rather than the number of customers.

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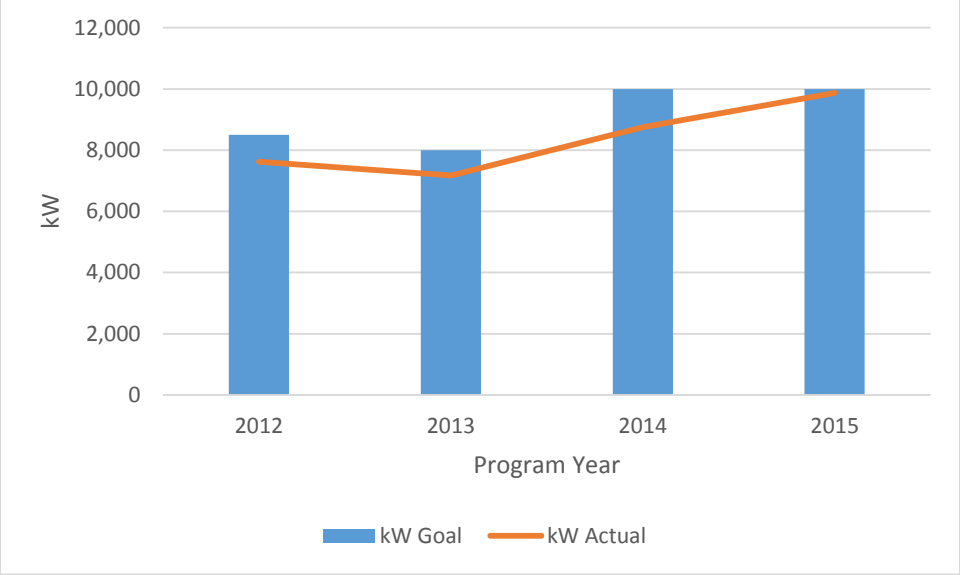
when it refiles the LMSOP for the 2017-2019 program cycle. However, the program came closer than it ever has to achieving its goals in 2015. Figure 33 represents the LMSOP annual demand reduction goals and achievements from 2012 to 2015.

Figure 33. LMSOP Goals vs. Actual, 2012-2015



In 2015, the total number of unique participating program customers remained constant at 10 (representing 19 meters; one fewer than in 2014). One of these customers operates two participating facilities with savings that are reported separately. Another customer removed two meters while reinstalling a meter removed from the program in 2014.[24] As in program years 2012 through 2014, a variety of business types participated in the 2015 program, including cold storage warehouses, water utilities, a bank, an agriculture products company, a building products manufacturer, and a county government customer.

The program's performance relative to its demand reduction goal notably increased in comparison with its performance in 2012 to 2014: while in previous years curtailment has ranged from 88% to 90% of goal, in 2015 the program achieved 99% of its goal. This likely resulted from more consistent participation (i.e., fewer event opt-outs), as well as a comparatively hot and dry curtailment season. A warmer event season can lead to increased baseline loads for customers whose controlled equipment is sensitive to fluctuations in weather, such as air conditioning.

In 2015, temperatures were higher on average—and high temperature days were more prevalent—than in 2014 and to a lesser extent 2013, as shown in Table 59. The number of days during the 2015 curtailment season when the temperature exceeded 90°F increased by 63% from 2014, while the

[24] In 2014, SWEPCO did not claim savings from a meter that controlled low load and did not curtail for any event or qualify for incentives. The customer reinstalled this meter in 2015.

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average monthly maximum temperature increased by 5°F and precipitation decreased by 51%. Although the same number of events was called in both years, it is likely that the consistent hot temperatures throughout the 2015 curtailment season led to a greater curtailable load available, and therefore helped the program nearly achieve its demand reduction goal.

Table 59. Little Rock International Airport Weather Characteristics, 2012–2015

Month	Monthly Maximum Temperature (°F)				Number of Days Exceeding 90°F				Total Precipitation (inches)			
	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015
June	107	101	93	99	20	16	16	22	0.9	3.2	5.5	2.8
July	111	100	96	101	30	20	10	28	1.5	2.2	7.2	4.8
August	106	99	97	102	24	24	21	24	5.7	3.6	2.0	0.6
September	100	101	95	99	7	17	9	17	5.4	3.2	2.0	0.1
Average	**106**	**100**	**95**	**100**	**N/A**				**N/A**			
Total	**N/A**				**81**	**77**	**56**	**91**	**13.5**	**12.2**	**16.7**	**8.2**

Source: National Climatic Data Center, National Oceanic and Atmospheric Administration. Monthly Summaries Station Details for Little Rock Airport Adams Field, Arkansas U.S. Accessed December 2014 and January 2016. http://www.ncdc.noaa.gov/cdo-web/datasets/GHCNDMS/stations/GHCND:USW00013963/detail.

In previous years, the program attained only a small portion of its annual energy-savings goal (22% in 2012, 17% in 2013, and 36% in 2014). Over these years, program staff reduced the LMSOP energy-savings target from 409 MWh in 2012, to 392 MWh in 2013, and to 320 MWh in 2014. In 2015, energy savings increased by 11% relative to 2014, commensurate with the increase in demand reduction. SWEPCO also reduced the energy-savings goal by another 38%, to 200 MWh in 2015, better aligning the goal with potentially achieved savings.

Approach

Table 60 lists the EM&V activities the Cadmus Team performed for LMSOP in 2015.

Table 60. 2015 LMSOP Analysis Activities

Impact Evaluation	NTG	Process Evaluation
• Database and document review • Baseline demand estimation • Load data analysis	• Stipulated value (1.0)	• Year-end interview - Utility program manager (n=1)

Below, we provide specific information regarding the Cadmus Team's research and analyses that are unique to the LMSOP. Appendix A provides detailed descriptions of Cadmus' general research and analytical methods.

Impact Evaluation Approach

The Cadmus Team conducted an impact analysis in conformance with the guidelines provided in the TRM 5.0. Specific impact evaluation activities are described below.

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Database and Document Review

To inform the 2015 impact and process evaluations, the Cadmus Team reviewed the following materials:

- Site-specific savings calculations and data[25]
- LMSOP customer agreement form

Baseline Demand Estimation

The program demand reduction, or curtailment, for a given event hour is the difference between the participant's actual demand during that hour and the demand that would have occurred without the program, also known as the baseline demand. In 2015, the Cadmus Team used the same baseline estimation approach as used in previous evaluations. We estimated a baseline load for each participating end point and for each event as the average 15-minute meter load during hours corresponding to event hours on the four days immediately prior to the event, not including weekends, holidays, or another event day.[26] Thus, if an event occurred from 2:00 p.m. to 6:00 p.m. on a Friday, the baseline load would be the average load during those same hours on the previous Monday through Thursday, assuming that week had no holidays.

Load Data Analysis

Demand Reduction

To determine the demand reduction due to LMSOP, the Cadmus Team calculated the kW demand over 15-minute intervals for each participant for two distinct time periods:

1. Event hours
2. Baseline hours

After calculating a baseline load for each LMSOP participating meter and each event, the Cadmus Team used the following equation to calculate program demand reduction:

$$\text{Curtailed Load} = \text{Baseline Load} - \text{Event Load}$$

[25] Data consisted of a Microsoft Excel file with 15-minute load data for each participating meter, as well as a summary of curtailment by event hour and meter. SWEPCO provided 11 additional Excel files showing claimed savings and analysis for each of the 10 program participants (one participant's data were divided between two files corresponding with different facilities).

[26] Note that the meter baseline for a test event can include days when other test events occurred. These prior test events will not impact the meter in question.

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The Team calculated curtailment for each participating meter, and then converted the result into 60-minute intervals by averaging the 15-minute load data. Then we averaged this hourly curtailment across each event for each meter, and summed across all meters to determine the total seasonal curtailment:

$$\text{Total}_{\text{Season}}\ \text{Curtailed Load} = \sum_{i=1}^{n} \text{Average}_{\text{Event}}\ \text{Curtailed Load}_{i}$$

Where for each meter 'i':

n	=	The number of end points in service during the curtailment season[27]
$\text{Average}_{\text{Event}}$ Curtailed Load	=	The average reduction across all hours and all events by meter

Thus, the Cadmus Team estimated demand reduction for each meter by subtracting the average 15-minute demand during each event from the average demand during the same hours on the baseline days. Then, for each meter, the Team averaged the *hourly* demand reductions for each event to determine the average kW curtailed for the season. We summed these hourly curtailments across meters to calculate the average program curtailment per hour.

Energy Savings

To calculate energy savings for each participant, Cadmus converted the average kW reduction for each hour into kWh savings. For each one-hour interval, the average kW reduction is equal to the kWh savings. Therefore, to translate the average hourly kW demand reduction into kWh savings, the Team summed the hourly demand reduction for each meter across all event hours, then summed across the participants affected by each event.

In addition to the peak events during the curtailment season, all meters participated in a test event in late May or early June. The Cadmus Team included the kWh reductions from these test events in the final savings calculations, but excluded the test events from demand reduction calculations, as these did not necessarily occur during conditions that necessitated a demand reduction and would therefore skew the seasonal demand reduction towards a lower value. Although one meter was renamed during the season as a result of a phone line change, meter installations were consistent.

NTG Evaluation Approach

The amount of demand reduction impact attributed to each meter derives directly from the *Program Agreement* between SWEPCO and the LMSOP participant. No benefits accrue from participating in the LMSOP beyond the incentive offered and reduced energy costs; therefore, no portion of these impacts would occur without the program. Thus, consistent with the approach used in previous years, the Cadmus Team applied a stipulated NTG value of 1.0.

[27] Note that the number of installed end points was constant throughout the curtailment season.

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Process Evaluation Approach

In accordance with TRM 4.0 Protocol C and the SWEPCO approved 2015 EM&V Plan, the Cadmus Team conducted a *condensed* process evaluation of LMSOP in 2015, which consisted of a year-end interview with SWEPCO's program manager. Although LMSOP did not achieve its savings goals in 2012-2014, the factors contributing to those shortfalls have previously been evaluated and documented, are well understood, and were largely beyond SWEPCO's control. As a result of the combination of these extenuating market conditions, SWEPCO's plans to address program challenges, and the small current sample size, the Cadmus Team determined that the program does not justify the allocation of resources required for a full process evaluation.

Evaluation Findings

Impact Evaluation Results

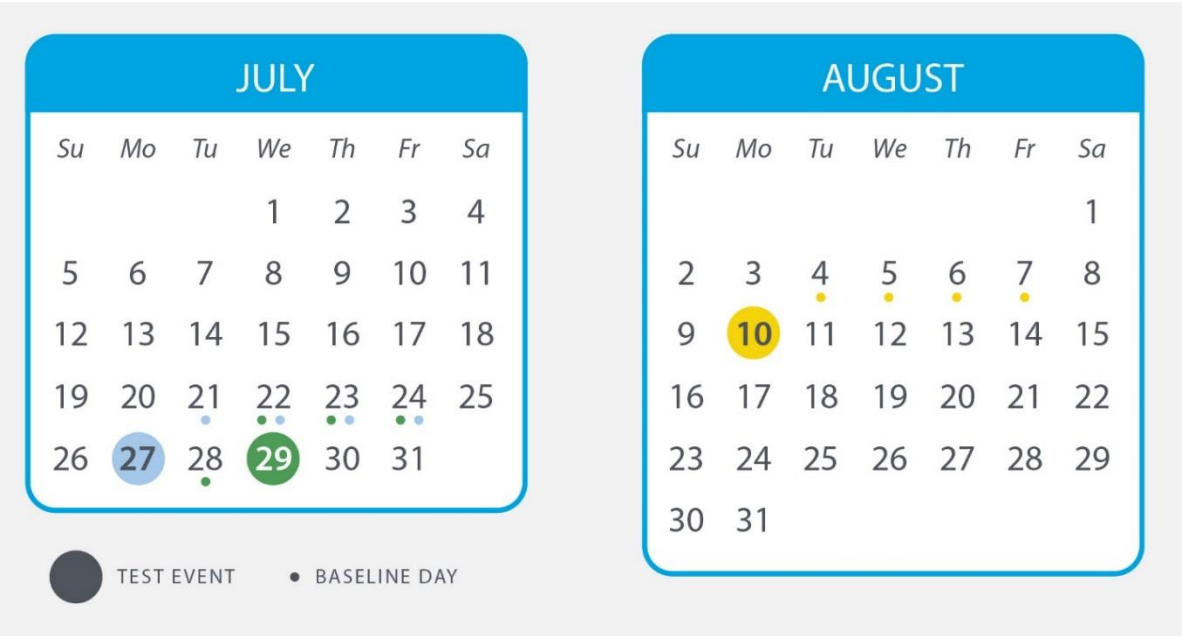
The following sections present the findings from each impact evaluation activity.

Database and Document Review

Through our review of each SWEPCO analysis workbook, and through communications with the utility program manager, the Cadmus Team identified several key characteristics about the 2015 LMSOP curtailment season.

During the curtailment season, SWEPCO called three events: July 27, July 29, and August 10. Each event lasted four hours, from 2:00 p.m. to 6:00 p.m. The four baseline days used for calculating demand reductions and energy savings for all three events are shown in Figure 34. Note that several baseline days are shared across events.

Figure 34. Event Days and Baseline Days Used in Baseline Estimates



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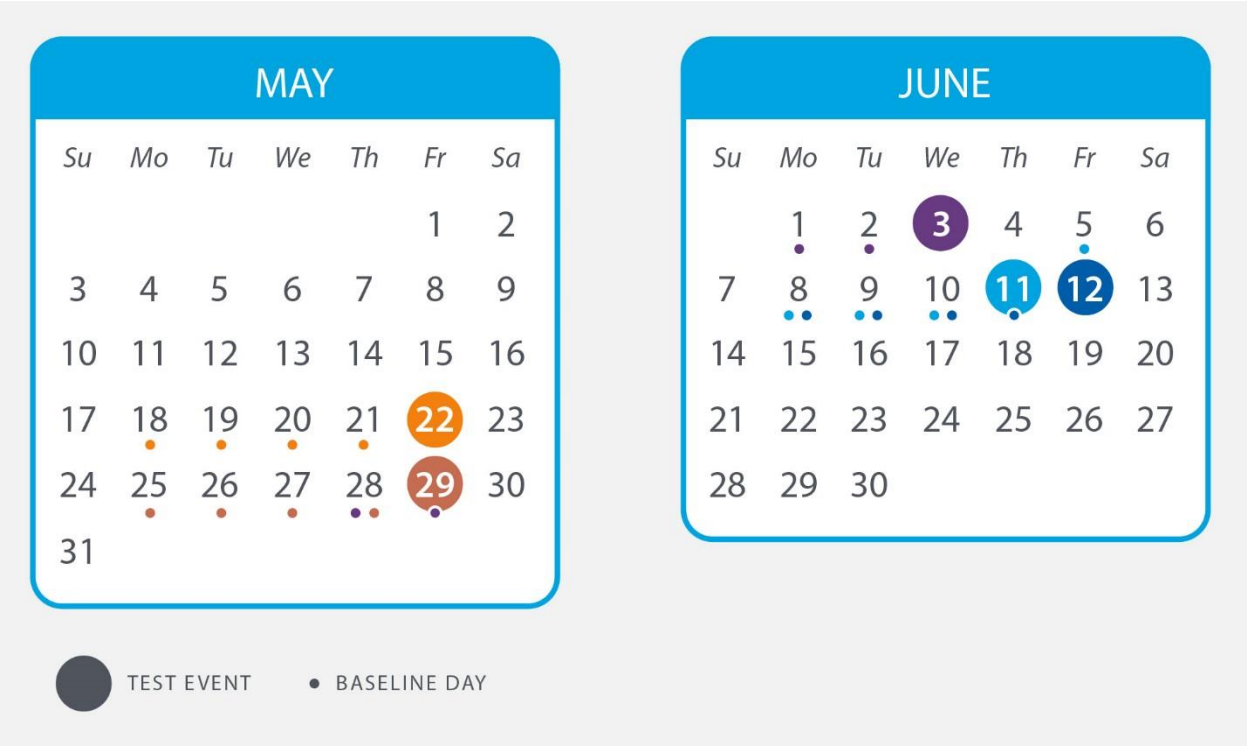
The total energy (kWh) saved by meter is the sum of the kWh curtailed across the three event dates and the test event dates. While the date of the test event varied by participant, all test events took place in late May or early June, as shown in Figure 35.

Figure 35. Test Event Days and Test Baseline Days Used in Baseline Estimates



When reviewing participant load data during events, the Team noted that several meters did not indicate a marked decrease in customer demand during events, due either to equipment problems or voluntarily opting out of an event. Two meters reported an instance of increased demand relative to their baseline usage: one during a test event and the other during an unscheduled event. The Cadmus Team included this negative curtailment in the program impact analysis to reflect the average over the event season more accurately.

Over the course of the season, 19 meters belonging to 10 unique customers participated in the program. One meter was renamed following the test event due to phone line changes, but no meters or participants left the program during the curtailment season.

Baseline Demand Estimation and Load Data Analysis

Customer Curtailment Levels

The average demand reduction per event varied considerably by participant, with average curtailment ranging from 273 kW to 1,720 kW across the season. The seasonal average curtailment exceeded 250 kW for all participants, as required by their contract with SWEPCO. However, the Cadmus Team

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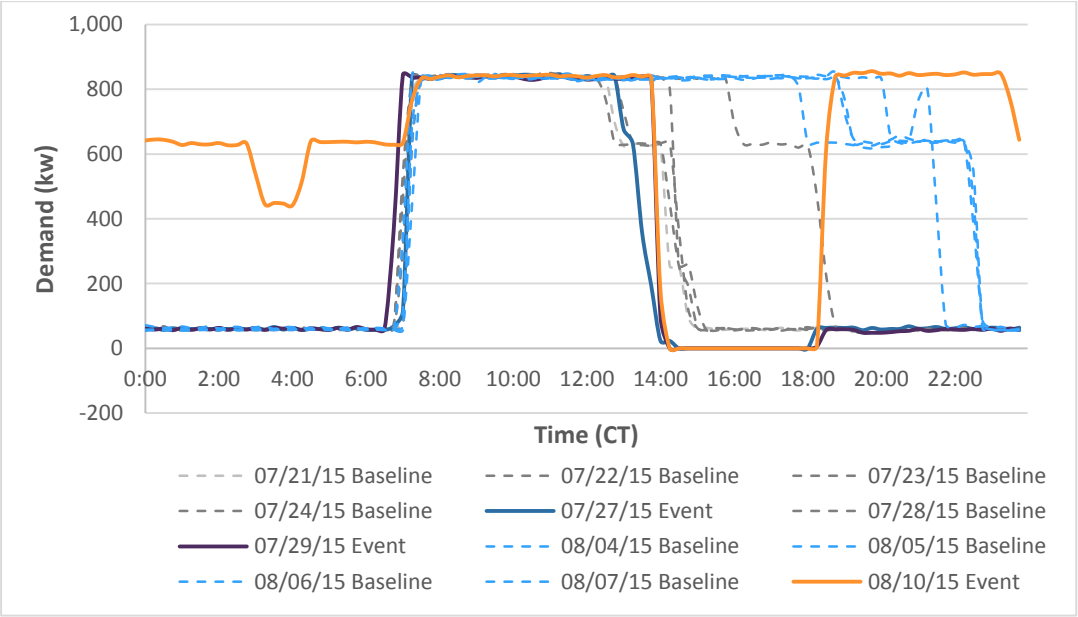
reviewed the average hourly curtailment for all meters and determined that two participants did not demonstrate a combined minimum demand reduction of 250 kW during test events. Two participants, including one who did not meet the 250 kW threshold for its test event, also failed to meet this threshold during an unscheduled peak event.

Both of the participants who did not meet the 250 kW reduction requirement for a full event in 2015 also missed this requirement at a seasonal level in 2014. One of these participants, a water utility, appears to have curtailed their entire baseline load during the event in which they missed the 250 kW threshold in 2015. Therefore, we do not suspect issues relating to the curtailment strategy, but surmise the participant could have been influenced by weather-related factors that diminished their available baseline load. This participant fell short of the 250 kW requirement in 2014, largely as a result of shorter hours of operation that reduced baseline consumption. Hours of operation are weather driven.

The Cadmus Team observed similarly reduced hours of operation during the baseline days for the July 27 and July 29 events, as shown in Figure 36. During those baseline days, load declined significantly between 1:00 p.m. and 3:00 p.m., resulting in a low baseline load.

Figure 36. 2015 Load Curves on Baseline and Event Days for Meter 3B0461B



According to SWEPCO staff in 2014, the other location that curtailed less than 250 kW during one event is a bank that transitions part of its load to an on-site generator during curtailment events. In 2014, the Team suspected that the low space cooling load driven by the cool temperatures in 2014 caused the curtailment shortfall, but low levels of curtailment recurred in 2015 in spite of higher temperatures. Thus, the Cadmus Team concludes that the shortfall in 2015 may have been due to insufficient load transfer to on-site generators or insufficient load available to transfer.

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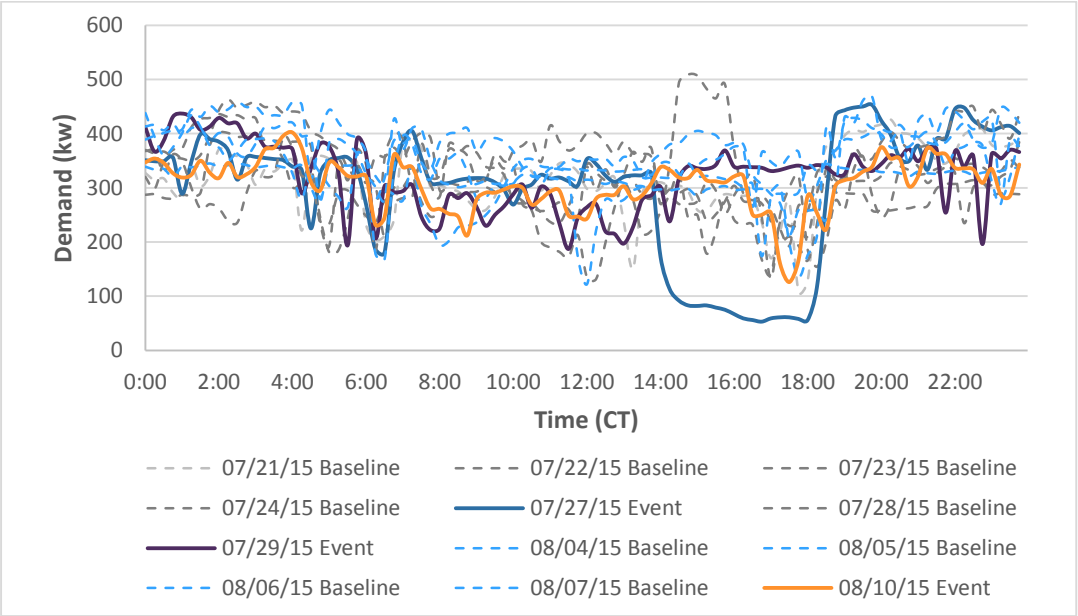
Curtailment Patterns and Variability

Cadmus observed a variety of irregular curtailment and baseline patterns across meters and across events. While many meters curtailed consistently during the season, others curtailed negligibly, or delivered highly variable savings over the season. The Team calculated the standard deviation of event curtailment across the 2015 season for each participant and found that, while standard deviations reached as high as 500 kW and 204% of a meter's average seasonal curtailment, just under half—nine out of 19—had a standard deviation below 100 kW, and four had a standard deviation of less than 25 kW.

However, when the relative rather than absolute curtailment is considered—that is to say, the percentage of baseline load curtailed during each event, rather than the kW demand reduction—12 of the 19 meters have a standard deviation of less than 10% and only four have a standard deviation greater than 30%. This indicates that while there is significant variability in the *amount* curtailed during each event, the *proportion* of load curtailed across the season is relatively consistent for the majority of participating meters.

Figure 37 provides an example of a meter with curtailment that varied significantly across events. The figure shows demand (kW) on all three event days, as well as on relevant baseline days. In one instance, the July 29 event, no curtailment took place; in fact, load during this event was higher than the baseline.

Figure 37. 2015 Load Curves on Baseline and Event Days for Meter 3B0945—Variable Baseline, Consistent Curtailment



In spite of the variability in loads, several meters were able to curtail all, or almost all, of their load during events. Figure 38 shows the load curve for meter 3B0985C, which belongs to a participant that was able to curtail load entirely during all events. For four of the 19 participating meters, all at different

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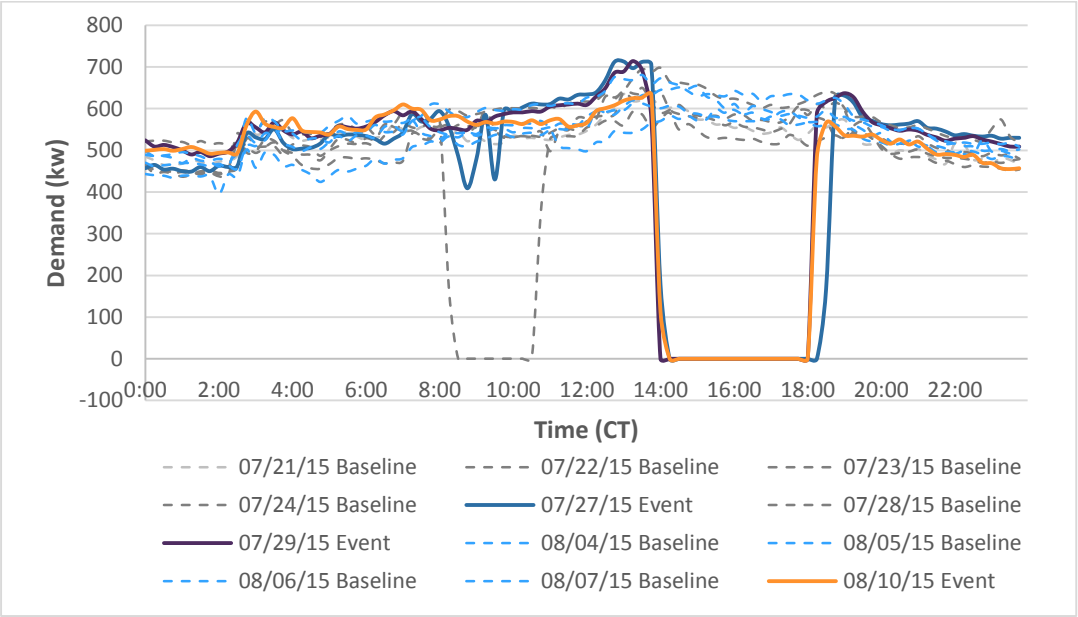
locations, customers were able to curtail more than 90% of their baseline load during at least two of the three events called.

Figure 38. 2015 Load Curves on Baseline and Event Days for Meter 3B0985C—Consistent Baseline and Event Load Patterns



During the 2015 season, five meters spanning three customers curtailed minimally, by less than 10% of their baseline load, during one or more event. One meter, 3B0594, showed limited curtailment during the first two events, with a small increase in curtailment during the third event (shown in Figure 39). This meter failed to curtail during the previous program seasons (2012–2014), as the Team noted in those respective evaluation reports.

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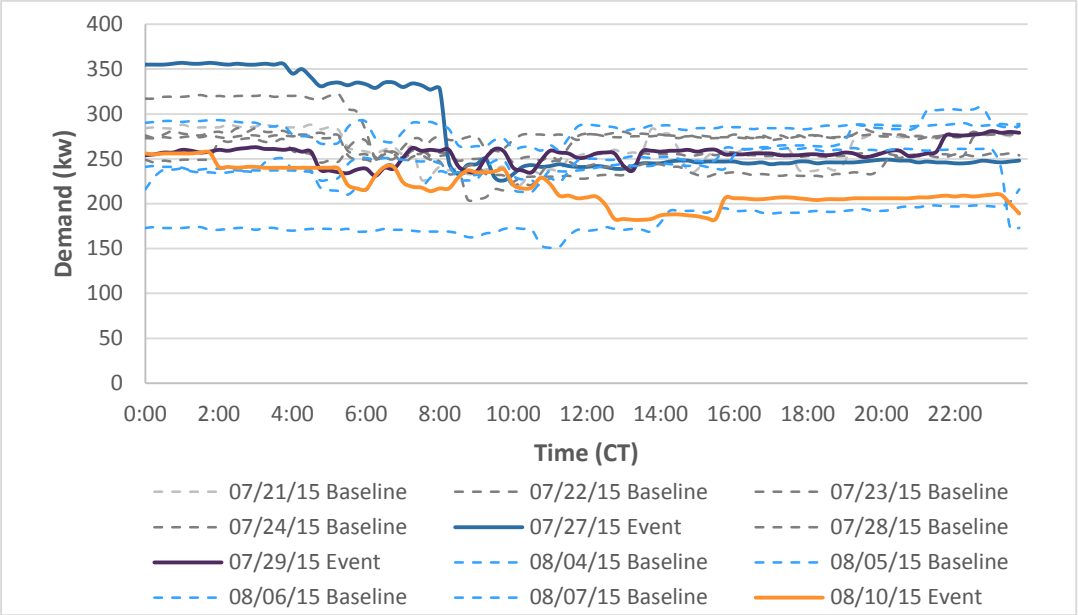
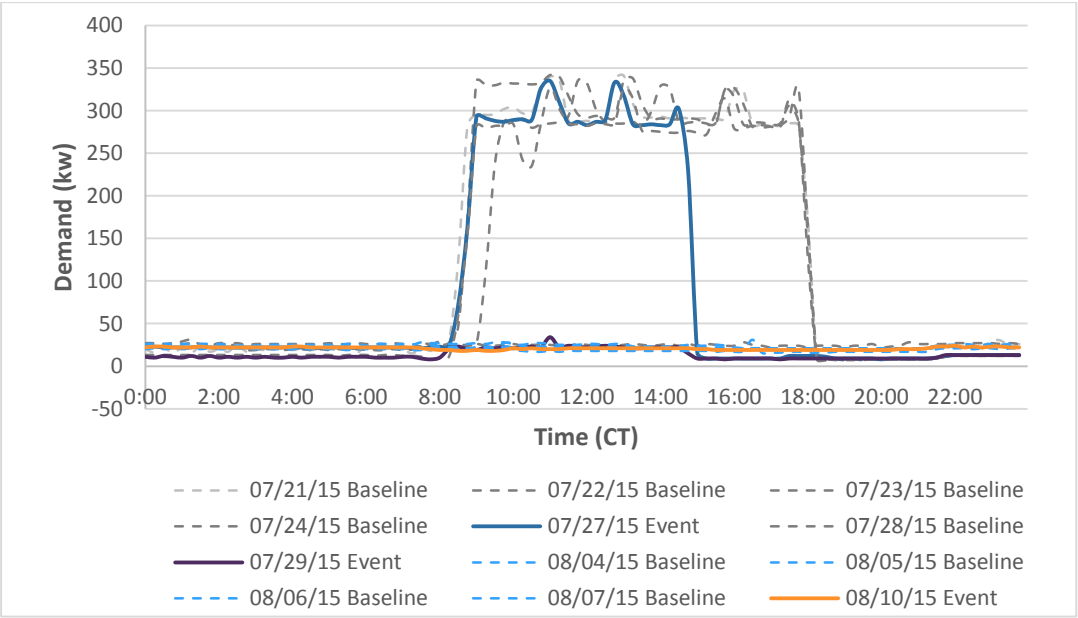
Figure 39. 2015 Load Curves on Baseline and Event Days for Meter 3B0594—No Apparent Curtailment



Another meter that indicated minimal curtailment during an event was limited by a marked decline in baseline load (see Figure 40). Although this customer, a manufacturing company, curtailed over 70% of its baseline load during the July 27 and July 29 events (161 kW and 207 kW reduced, respectively), during the August 10 event, the meter's baseline load was only 20 kW. As a result, the meter reflected curtailment of less than 1 kW during this event.

Figure 40. 2015 Load Curves on Baseline and Event Days for Meter 3B1084—Low Baseline Event



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Evaluated Gross Savings

The Cadmus Team estimated *ex post* gross energy savings of 127 MWh, which resulted in a realization rate of 100% (see Table 61). In 2014, realization rates were somewhat lower than 100% as a result of the Team including negative curtailment (i.e., event time periods when the event load exceeded the baseline load) in overall calculations, while SWEPCO capped negative curtailment at zero. In 2015, SWEPCO adjusted its approach to match the Team's treatment of negative curtailment, resulting in an exact alignment of *ex ante* and *ex post* savings.

Table 61. 2015 LMSOP *Ex Ante* and *Ex Post* Gross Energy Savings

Ex Ante Gross Energy Savings (MWh)	*Ex Post* Gross Energy Savings (MWh)	Realization Rate
127	127	1.00

The Team estimated *ex post* gross demand reduction of 9,868.5 kW, which resulted in a realization rate of 100% (see Table 62).

Table 62. 2015 LMSOP *Ex Ante* and *Ex Post* Gross Demand Reduction

Ex Ante Gross Demand Reduction (kW)	*Ex Post* Gross Demand Reduction (kW)	Realization Rate
9,868.5	9,868.5	1.00

Cadmus calculated demand reduction and energy savings for each test event and unscheduled event called during the 2015 season, as shown in Table 63. The maximum event curtailment occurred on July 27, with a demand reduction of 10,067.3 kW at the meter. Over the season, the standard deviation of curtailment by event was 2.7% (267.1 kW), with curtailment for all events falling within 3.1% of the seasonal average.

Table 63. 2015 LMSOP Gross Savings by Curtailment Event

	Ex Post Gross Demand Reduction (kW)	*Ex Post* Gross Energy Savings (MWh)
Test Events	N/A	8
July 27, 2015	10,067.3	40
July 29, 2015	9,564.9	38
August 10, 2015	9,973.3	40
Seasonal*	**9,868.5**	**127**

* Seasonal demand reduction is the average demand reduction per unscheduled event, while seasonal energy savings are the sum of energy savings across all events, including test events.

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NTG Evaluation Results

Because LMSOP is a demand response program, it is highly unlikely that the energy savings or demand reduction produced by participants would exist without the program. Thus, the Team stipulated a 100% NTG. Table 64 presents *ex post* gross and *ex post* net savings using 100% NTG.

Table 64. LMSOP Net Energy Savings and Demand Reduction

Metric	*Ex Post* Gross Savings	Net Savings	NTG Ratio
Annual Energy Savings (MWh)	127	127	1.00
Average Event Coincident Demand Reduction (kW)	9,868.5	9,868.5	1.00

Process Evaluation Summary

For 2015, SWEPCO made no program design changes and operated under the same curtailment requirements and process as in 2014. The utility program manager noted in the year-end interview that LMSOP ran smoothly in 2015, and there were no issues with the program budget, data management, or reporting.

In response to the three curtailment events called during 2015, the utility program manager reported that customers shifted their load more so than in the past. All 10 customers who contractually agreed to participate met their curtailment commitments on average over the season, although Cadmus observed shortfalls on certain test events and peak events. Most customers who participated in 2015 were returning participants from previous years.

With the current small number of participants, the utility program manager maintains one-on-one communication with each participant through direct phone calls and in-person delivery of incentive checks. These personal interactions may be a reason the program retains its participants year after year.

However, SWEPCO still struggles with recruiting new program participants due to the relatively high curtailment requirements (i.e., participants must be able to curtail a minimum of 250 kW for up to four hours when called upon by SWEPCO). The program manager explained that marketing and outreach are targeted to customers who can meet the curtailment requirements. Therefore, only large customers whose facilities have on-site generators or who can deal with a four-hour shutdown without affecting their businesses can meet the curtailment requirements. Facilities such as hospitals, grocery stores, and office buildings cannot meet the curtailment requirements because their businesses require HVAC equipment to be running during peak events.

2015 and Future Program Changes

The utility program manager reported having no program changes planned for 2016; however, SWEPCO does plan to refile LMSOP for the 2017-2019 program cycle with revised, possibly tiered incentive offerings and a lower curtailable demand threshold. SWEPCO hopes these revisions will better align program goals with the number of eligible program customers and enable smaller businesses to participate.

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Progress on Implementation of Recommendations

Table 65 lists the status of the 2014 recommendations for LMSOP. As shown, SWEPCO has addressed two of the three 2014 program recommendations to date. SWEPCO may consider the remaining and 2014 recommendation while developing its 2017-2019 Energy Efficiency Plan filing. All recommendations made in prior years have been addressed.

Table 65. Status of 2014 LMSOP Recommendations

Year	Recommendation	2015 Status
2014	Review meters with low participation over multiple events to assess whether they are able to actively continue participating in the program.	***Completed***. SWEPCO reviews customers' meters and equipment and inquires about any business operation changes to ensure that customers can participate in curtailment events. During the 2015 program year, all customers met their curtailment commitments.
2014	Provide technical support to customers having difficulty meeting the program eligibility rules. This may include cataloging and reviewing controlled equipment for potential susceptibility to weather volatility, as well as assessing other equipment that could potentially be called on to curtail when needed to meet program requirements.	***Completed***. SWEPCO conducts customer site visits to review meters and facility equipment, and follows up with those customers who need technical support.
2014	To avoid ambiguity, provide language describing how program participants who do not meet the 250 kW curtailment requirement for one or more events will be treated in program reporting and evaluation processes.	***Incomplete***. SWEPCO has not updated the program agreement document.

2015 Conclusions and Recommendations

In its review of the LMSOP, the Cadmus Team found that the program operates well given its constraints on participation. Although LMSOP did not meet its 2015 program savings goal, it exceeded the program's typical performance over the past three years, with demand reductions nearly meeting the 2015 goal, and delivered consistent curtailment across the season. A long-standing group of participants demonstrates consistent satisfaction with the program and the personal attention they receive as participants.

Conclusion: Not all customers were able to meet the program's 250 kW curtailment requirement for all events called in 2015. Furthermore, the two LMSOP customers who were unable to meet the 250 kW curtailment requirement for one or more events in 2015 were also unable to meet this level of curtailment for the 2014 season. SWEPCO is aware that the 250 kW curtailment requirement has been

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contributing to difficulty in achieving program goals, and is therefore considering a lower curtailable demand threshold for the next program year.

Recommendation: Proceed with plans to lower the curtailable demand threshold in the 2017-2019 energy efficiency plan to enhance existing participation and recruit more customers in the 2017 program year. Alternatively, consider lowering the demand reduction goal.

Recommendation: Identify customers who may have difficulty with the curtailment requirements early in the program year (e.g., following a test event) and provide technical support in advance of the first event. This may include cataloging and reviewing controlled equipment for potential susceptibility to weather volatility, as well as assessing other equipment that could potentially be called on to curtail when needed to meet program requirements. Taking early action will ensure that customers can reach the threshold in all called events.

Conclusion: SWEPCO could have called one more event during the curtailment season, which would have allowed the program to reach its demand reduction goal. The curtailment season in 2015 had consistently high temperatures, with marked increases in monthly maximum temperatures, precipitation, and the number of days in which temperatures exceeded 90°F relative to 2014 levels. Yet, the number of events SWEPCO called remained consistent between 2014 and 2015, at three of a possible 12 events being called during the season. SWEPCO had 19% of the program budget remaining after calling three events, which may have been enough to call one more event and issue more incentive payments. SWEPCO notes that, while calling an additional event might have resulted in meeting their energy goal, the average demand reduction might also have decreased. Moreover, the decision to call an event is based on SWEPCO's daily peak load forecast across all units, including in Texas and Louisiana.

Recommendation: Continue to examine program tradeoffs between energy savings, demand reduction, and customer incentives arising from an increase in the number of curtailment events. Additional events will augment the program's energy savings, but will increase incentive payments and may impact seasonal demand reductions.

Conclusion: Some meters were curtailed minimally or not at all for one or more events during the 2015 season. In particular, one meter has consistently produced negligible curtailment throughout the 2012–2014 program years. In 2015, this meter curtailed less than 23 kW, or less than 10% of its baseline load, on average over the season. During its 2015 test event, the meter indicated that load *increased* relative to the baseline by 116 kW. Therefore, meters that do not indicate curtailment during the event season should not be counted towards participation, even if they still participate in the program at the utility's discretion. Since SWEPCO is not obligated to meet a specific participation target, however, the Cadmus Team does not formally recommend that SWEPCO require a minimum reduction by meter.

Areas for Further Research

SWEPCO indicated their intention to refile the LMSOP for the 2017-2019 program cycle, with revised incentive offerings and a lower curtailable demand threshold. Depending on the composition of the

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expanded participant pool and the curtailment strategies employed, the Cadmus Team recommends that alternative baseline calculation methodologies be explored. Especially if weather-sensitive loads are prevalent, a baseline adjustment may improve estimates of baseline load and, as a result, curtailment.

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Residential ENERGY STAR Appliance Program

Program Overview

SWEPCO originally launched the RESAP in 2008, and made only modest changes since, most significantly in 2011 when they expanded the program measure offerings and began to include both retailer and mail-in rebate options. Through the RESAP, SWEPCO offered residential customers' prescriptive incentives through a mail-in rebate for qualifying refrigerators, clothes washers, and window air conditioner units purchased at participating retail stores.[28] As of December 31, 2015, SWEPCO formally discontinued the RESAP.

Customer Requirements

Through the RESAP, SWEPCO targets residential customers who purchase a qualifying appliance from a participating retailer.

CLEAResult implemented the program with oversight from SWEPCO. To deliver the program, implementation staff would visit partner retailers and provide program information, in-store signage, and rebate applications for retailers to distribute to interested customers.

2015 and Future Program Changes

As of December 31, 2015, SWEPCO formally discontinued the RESAP and eliminated refrigerators and window air conditioners from its portfolio. In 2016, SWEPCO will continue to offer ENERGY STAR clothes washers, as well as a new appliance measure—advanced power strips—under a new Residential Lighting and Appliances Program.

2015 Performance

Since it was launched, the RESAP has fallen well short of its goals. As in prior years, the Cadmus Team attributed these continued shortfalls to unrealistic program goals, which were initially set without complete information about SWEPCO's market potential, and to limited opportunity for program growth (after SWEPCO established program partnerships with the vast majority of applicable retailers in its highest density customer population centers in 2012). See the 2012 and 2013 Energy-Efficiency Portfolio Evaluation reports for a discussion of additional challenging market conditions. Table 66 provides a summary of 2015 RESAP results.

[28] Partner retailers would have an agreement with SWEPCO to promote the program in their stores by putting up signage, hanging tags on the qualified units, and providing rebate forms to customers.

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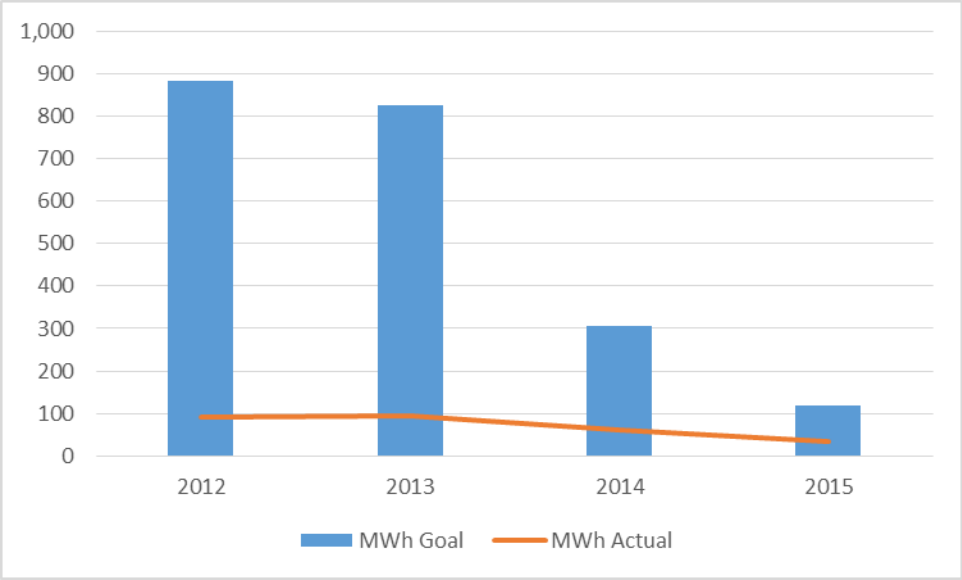
Table 66. Residential ENERGY STAR Appliance Program 2015 Goals vs. Actuals

	2015 Goal	2015 Actual	Percentage of Goal Achieved	2014-2015 Percentage Change*
Energy Savings (MWh)	120	33	28%	↓ 45%
Demand Reduction (kW)	166	6	4%	↓ 40%
Participation (appliances)	3,000	516	17%	↓ 43%
Budget	$625,013	$283,846	45%	↓ 10%

* Change in actual achieved results and spending from 2014.

Figure 41 represents the ENERGY STAR Appliance Program annual energy savings goals and achievements from 2012 to 2015.

Figure 41. Residential ENERGY STAR Appliance Program Goals vs. Actual, 2012-2015



Approach

Table 67 lists the EM&V activities the Evaluation Team performed for RESAP in 2015. Because the program was discontinued at the end of 2015, the Evaluation Team did not conduct a process evaluation.

Table 67. 2015 Residential ENERGY STAR Appliance Program Analysis Activities

Impact Evaluation	NTG
• Database and document review • TRM deemed savings calculations review	• Secondary research (0.52)

Below, we provide specific information regarding the Cadmus Team's research and analyses that are unique to the RESAP. Appendix A provides detailed descriptions of Cadmus' general research and analytical methods.

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Impact Evaluation Approach

The Cadmus Team conducted an impact analysis in conformance with the guidelines provided in TRM 5.0. Specific impact evaluation activities are described below.

Database and Document Review

To inform the 2015 impact evaluation, the Cadmus Team reviewed the following materials:

- Program status reports
- Program participation database

TRM Deemed Savings Calculation Review

The Team calculated savings for each program measure using the algorithms and parameter definitions provided in TRM 5.0 and, where necessary, in TRM 4.0.

NTG Evaluation Approach

Cadmus conducted a literature review, identifying seven recent appliance programs with measure offerings similar to those in SWEPCO's program. Using reported NTG values in the benchmarked programs, we calculated an average NTG value for the RESAP in Arkansas.

Process Evaluation Approach

Because the RESAP was discontinued at the end of 2015, the Cadmus Team did not conduct a process evaluation of 2015 activities.

Evaluation Findings

Impact Evaluation Findings

The following sections present the findings from each impact evaluation activity.

Database and Document Review

The Cadmus Team inspected the program database for completeness and accuracy. We selected a sample of 36 measures to verify that units were ENERGY STAR-qualified. This sample accounted for 37% of all program units. Based on this review, we conclude that all claimed units were ENERGY STAR qualified and were thus eligible for claimed savings.

TRM Deemed Savings Calculation Review

The Team evaluated the census of incentivized units. The total *ex post* gross savings for the RESAP was 63.43 MWh, with a demand reduction of 11.24 kW and overall realization rates of 100%. Table 68 and Table 69 shows the final *ex ante* and *ex post* gross energy savings and demand reduction estimates, respectively.

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Table 68. Residential ENERGY STAR Appliance Program *Ex Ante* and *Ex Post* Gross Energy Savings

Measure	*Ex Ante* Gross Energy Savings (MWh)	*Ex Post* Gross Energy Savings (MWh)	Realization Rate
Refrigerator	11.49	11.55	101%
Window Air Conditioner	0.70	0.69	98%
Clothes Washer	51.24	51.19	100%
Total*	**63.43**	**63.43**	**100%**

* Totals may not sum due to rounding.

Table 69. Residential ENERGY STAR Appliance Program *Ex Ante* and *Ex Post* Gross Demand Reduction

Measure	*Ex Ante* Gross Demand Reduction (kW)	*Ex Post* Gross Demand Reduction (kW)	Realization Rate
Refrigerator	1.67	1.68	101%
Window Air Conditioner	0.86	0.86	100%
Clothes Washer	8.71	8.70	100%
Total	**11.24**	**11.24**	**100%**

For the refrigerator measure, both the implementer and the Cadmus Team used TRM 5.0 to determine savings. The energy and demand realization rates are both 101% because three incentivized units exhibited realization rates above 100%. The implementer confirmed that data entry or analysis errors caused incorrect *ex ante* savings values. The rest of the units matched *ex ante* and *ex post* savings exactly.

The window air conditioner measure has realization rates of 98% for energy savings and 100% for demand reduction. Both the implementer and Cadmus used TRM 5.0 to determine savings. The slight decrease in the energy realization rate is due to the implementer using the general room AC adjustment factor (RAF) of 0.49 for all units, whereas the Cadmus Team used the RAF specific to each weather zone.

The Cadmus Team used TRM 4.0 to determine savings for clothes washers. The TRM 5.0 algorithm requires information about the configuration of the equipment, (i.e., whether it is a top or front loading unit); however, this information was not gathered in 2015. The energy and demand realization rates for clothes washers are both 100%.

Evaluated Gross Demand Reduction and Energy Savings

The Cadmus Team estimated *ex post* gross energy savings of 63 MWh, which resulted in an overall realization rate of 100% (see Table 70).

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Table 70. Residential ENERGY STAR Appliance Program *Ex Ante* and *Ex Post* Gross Energy Savings

Ex Ante Gross Energy Savings (MWh)	*Ex Post* Gross Energy Savings (MWh)	Realization Rate
63	63	100%

The Team estimated an *ex post* gross demand reduction of 11 kW, which resulted in a realization rate of 100% (see Table 71).

Table 71. Residential ENERGY STAR Appliance Program *Ex Ante* and *Ex Post* Gross Demand Reduction

Ex Ante Gross Demand Reduction (kW)	*Ex Post* Gross Demand Reduction (kW)	Realization Rate
11	11	100%

NTG Results

The Cadmus Team reviewed appliance program NTG values from seven evaluation studies conducted between 2010 and 2014. Table 72 shows the studies and NTG ratios identified. These programs yielded an average NTG ratio of 52%, which is a slight increase (2%) over the 2014 RESAP NTG, which also relied on a secondary research approach.

Table 72. Appliance Programs' NTG Benchmarking

Program	Year	NTG
Avista – ENERGY STAR Products	2013	23%
Commonwealth Edison – Smart Ideas Program, ENERGY STAR Residential Clothes Washer Rebate	2011	68%
EmPOWER Maryland – Appliance Rebate Program	2013	35%
Salt River Project – Prescriptive Rebate Appliances	2010	40%
Ameren Illinois – Residential Efficient Products (overall program value)	2014	84%
Georgia Power – EarthCents Residential Lighting and Appliances	2011	51%
Ameren Missouri – ApplianceSavers	2013	64%

Table 73 shows the final evaluated net savings for the RESAP. Applying the 52% NTG to *ex post* gross savings results in *ex post* net energy savings of 33 MWh and demand reduction of 6 kW.

Table 73. Evaluated Net Savings

Metric	*Ex Post* Gross	*Ex Post* Net	NTG
Energy Savings (MWh)	63	33	52%
Demand Reduction (kW)	11	6	52%

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2015 and Future Program Changes

As described previously, SWEPCO will no longer offer the RESAP beginning in 2016. SWEPCO will continue to offer incentives for high-efficiency clothes washers as well as a new measure—advanced power strips—under a re-designed Residential Lighting and Appliances Program beginning in 2016.

Progress on Implementation of Recommendations

Table 74 lists the status of the 2014 recommendations for the RESAP. As shown, SWEPCO has addressed all program recommendations to date.

Table 74. Status of 2014 RESAP Recommendations

Year	Recommendation	2015 Status
2014	Consider either eliminating the RESAP or adding the program offerings to the RSOP (if the RSOP can maintain its cost-effectiveness) when developing the 2016-2018 filing.	***Completed***. SWEPCO formally discontinued RESAP on December 31, 2015, but will continue to offer clothes washers under a different program.
2014	For refrigerator measures, have the implementer collect the age of the early replacement unit, the fresh volume, and the freezer volume.	***Not Applicable.*** SWEPCO will no longer offer refrigerators as part of its efficiency portfolio beginning in 2016.

2015 Conclusions and Recommendations

Conclusion: The Cadmus Team was not able to calculate savings for clothes washers using TRM 5.0 because additional information must be collected from the customer: whether the units are top or front loading washers.

Recommendation: For the clothes washer measures, which will continue to be offered under the re-designed Residential Lighting and Appliances Program in 2016, have the implementer collect information about whether incentivized units are top or front loading.

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Home Performance with ENERGY STAR Program

Program Overview

SWEPCO originally launched HPwES in 2012, making modest changes to the program since then to adapt to market circumstances. In 2015, SWEPCO began preparing to integrate HPwES with the statewide Consistent Weatherization Approach, scheduled to launch in 2016.

Customer Requirements

With the HPwES Program, SWEPCO targets residential customers residing in single-family homes.

Participating customers receive a comprehensive energy audit to identify cost-effective energy-saving opportunities in their homes and available incentives to offset the upfront cost of installing energy-efficient upgrades. CLEAResult implements the program and oversees the participating contractors, both auditors and installers.

SWEPCO customers have three entry points to the program: they may 1) directly contact a participating energy auditor to schedule an on-site audit, 2) call the program implementer or SWEPCO, who connects them with a program auditor, or 3) be directly approached by a contractor who performs energy assessments and makes installations in one visit.

The participating energy auditor installs free direct-install measures and provides customers with gas and electric energy efficiency upgrade recommendations.[29] Upgrades may be installed by the auditor or by a qualified installation team.[30] Prior to installation, the customer or contractor reserves the corresponding incentives, which SWEPCO holds for 90 days then provides to the contractor or customer, as appropriate, within four to six weeks of project completion.

2015 and Future Program Changes

In 2015, SWEPCO retained program changes made in 2014, and implemented two additional changes. SWEPCO continued the $0.10 per square foot energy usage qualifier added in 2014, intended to reduce participation from customers with lower savings potential.[31] Customers that do not meet this criteria are still eligible if they install at least two measures (free direct install measures excluded)[32].

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29 Contractors provide information about SWEPCO's electric incentives and about the SourceGas natural gas program incentives. SWEPCO only provides incentives for electricity saving measures.

30 Program performance installation teams are groups of qualified contractors who may provide a variety of services including installing HVAC, water heating, and insulation measures.

31 To qualify for the program, the customer must have energy usage of $0.10 per square foot or greater based on their highest bill from the past six months.

32 If customers do not install two or more measures recommended by their energy auditor, they are shifted from HPwES to the RSOP program and are eligible for any applicable incentive under that program.

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In 2015, SWEPCO changed the customer eligibility requirements to more closely align program offerings with the statewide Consistent Weatherization Approach, scheduled to launch in 2016. Specifically, customers who reside in multifamily homes with three or more units will not be eligible to participate in the statewide program; SWEPCO began redirecting these multifamily projects to RSOP. Program staff also reported modifying trade ally training in 2015 to prepare trade allies for the upcoming Consistent Weatherization Approach.

Additionally, in 2015, program staff added an incentive for contractors who achieve the top tier for both duct and air sealing measures. Top tier indicates that the contractor achieved the highest tier of leakage reduction on both duct and air sealing. Additionally, SWEPCO instituted a quota system for contractors that helped ensure year round budget and contractor availability (this is discussed in greater detail in the Trade Ally Engagement section).

The program's most significant change to date will occur in 2016, when the Consistent Weatherization Approach is launched. As a result, the HPwES Program will have an expanded budget and an increased participation target. Program and implementation staff welcomed the unified approach to weatherization spanning multiple utilities (including gas utilities) because it will offer a consistent program model and level of service to customers regardless of their utility.

The 2016 weatherization program will include changes to measure rebates in the HPwES Program. The comprehensive energy assessment, air sealing, attic insulation, duct sealing, wall insulation, and various direct install measures will be provided to eligible residential customers at no cost. This no cost model has increased trade ally interest in buying and getting trained on using attic insulation equipment. Program and implementation staff reported that they plan on having an outside trainer in 2016 who can provide targeted professional certification courses to contractors. The changed HPwES Program will also require SWEPCO to adjust its customer eligibility requirements, such that residences cannot have participated in a weatherization program within the last five years, the home must have been occupied for a minimum of a year, and the home must be at least 10 years old or meet the $0.10 per square foot requirement.

Finally, in 2016, quality assurance of the contractors work will increase, as the implementer will conduct an additional pre-inspection before the contractor begins work on the home. The increased level of scrutiny is another signal to trade allies that SWEPCO continues to require a high level of service and professionalism.

2015 Performance

Table 75 summarizes HPwES Program accomplishments in 2015. The program exceeded its energy-savings goal by 61% and its demand reduction goal by 11%. The HPwES Program also far exceeded its participation goal, achieving 362% of the measure installation target.

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Table 75. HPwES Program 2015 Goals vs. Actuals

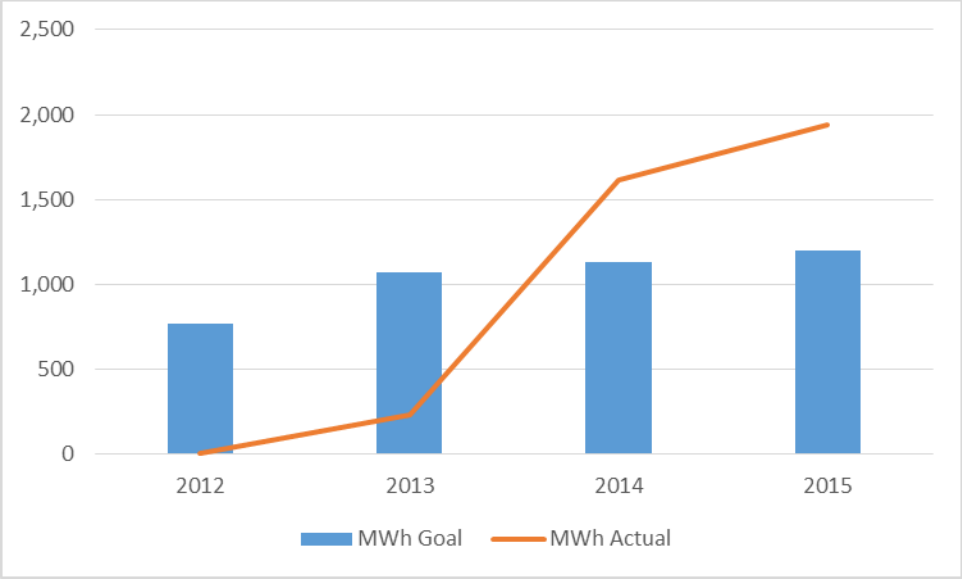
	2015 Goal	2015 Actual	Percentage of Goal Achieved	2014-2015 Percentage Change*
Energy Savings (MWh)	1,200	1,921	160%	↑ 19%
Demand Reduction (kW)	573	634	111%	↑ 64%
Participation (measures)	3,200	11,598	362%	↑ 252%
Budget	$1,170,294	$1,112,410	95%	↑ 1%

* Change in actual achieved results and spending from 2014.

The success of the program in 2015 can be attributed, in part, to changes in trade ally engagement, such as: 1) changing contractor incentives by adding a top tier bonus to encourage contractors to achieve deeper savings from each household, and 2) instituting a quota system for higher volume contractors that helped ensure year round program availability.

Low customer awareness and a limited number of eligible contractors inhibited HPwES Program performance for the first two years of operation; however, by the third quarter of 2014, the program had ramped up significantly, and exceeded both participation and savings goals that year. In recognition of these 2014 achievements, the program received an award as the *Partner of the Year* for *Energy Efficiency Program Delivery*. The program continued to ramp up savings achievement in 2015, again exceeding the program goal, although the pace began to level off somewhat. Figure 42 represents the HPwES Program annual energy savings goals and achievements from 2012 to 2015. Based on the program's performance in 2015, SWEPCO has been recognized as the ENERGY STAR Partner of the Year for the second year in a row.

Figure 42. Home Performance with ENERGY STAR Program Goals vs. Actual, 2012-2015



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Approach

In 2015, the Cadmus Team conducted impact evaluation activities at mid-year and at the end of the program year. In the mid-year data review, SWEPCO submitted data via secure file transfer portal for rebates distributed from January 1 to July 1, 2015. Cadmus reviewed the data for errors or omissions, and provided SWEPCO with a memo summarizing the results of our review and identifying items we needed to complete the final data analysis at the close of the program year.

Table 76 lists the EM&V activities performed by the Cadmus Team for the HPwES Program in 2015.

Table 76. 2015 HPwES Program Analysis Activities

Impact Evaluation	NTG	Condensed Process Evaluation
• Database and document review • Modeling review • TRM deemed savings calculations review	• Applied 2014 value (0.97)	• Year-end interviews - Utility Program Manager (n=1) - Implementer Manager (n=1)

Below, we provide specific information regarding the Cadmus Team's research and analyses that are unique to the HPwES Program. Appendix A provides additional information about Cadmus' general research and analytical methods.

Impact Evaluation Approach

The Cadmus Team conducted an impact analysis in conformance with the guidelines provided in TRM 5.0. Specific impact evaluation activities are described below. In 2015, Cadmus focused program research activities on a comprehensive review of the simulation model and parameter value input assumptions that are used in the TRM to estimate measure savings. The goal of this evaluation effort was to better understand the model inputs and to benchmark the output values using available energy use data or reliable secondary sources.

Database and Document Review

To inform the 2015 HPwES impact and process evaluations, the Cadmus Team reviewed the following materials:

- 2015 HPwES Program manual
- 2015 HPwES website
- Request for Qualifications 2016 Home Performance with ENERGY STAR
- 2015 HPwES Program tracking data
- 2015 HPwES Program simulation model

Cadmus reviewed SWEPCO's program tracking databases and other documentation to assess the quality of information and the presence of anomalous entries, outliers, duplicates, and missing values. This activity included reviewing all data fields recommended in TRM 5.0 Protocol A and those necessary to calculate deemed savings per the TRM 5.0 Volume 2.

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TRM Deemed Savings Calculation Review

The Cadmus Team calculated savings for each measure claimed by the program using the algorithms and parameter definitions provided in the TRM 5.0. The Team relied on inputs and measure-specific program tracking data for the savings calculations. Where *ex post* savings estimates differed from *ex ante*, we contacted the implementer to investigate reasons for the difference.

Simulation Model Review

To evaluate savings claims for insulation and sealing, the Cadmus Team reviewed the simulation model (in BeOpt) that serves as the basis for measure savings in the TRM. The Team performed a technical review of the parameters used in all of the whole-house baseline and as-built models. By means of this comprehensive review, Cadmus assessed the reasonableness of the modeled savings, checked for consistency across various building prototypes, and evaluated the accuracy of an average home's characteristics in Arkansas. We also made sure that a unified set of assumptions were maintained when modeling across different climate zones for a single measure type.

NTG Evaluation Approach

In 2014, the Cadmus Team surveyed 31 HPwES participants who had installed rebated measures, capturing primary data on freeridership and spillover. We used this data to calculate a 2014 NTG estimate for the HPwES Program. We applied this 2014 NTG value to 2015 gross savings to estimate 2015 net savings.

Process Evaluation Approach

In accordance with TRM 5.0 Protocol C and the SWEPCO approved 2015 EM&V Plan, the Cadmus Team conducted a *condensed* process evaluation of the 2015 HPwES Program. In 2014, the program exceeded its energy savings (MWh) goal. Due to consistent improvement in the program's performance and because SWEPCO has indicted no significant challenges or concerns with the program, the Team determined that a *condensed* process evaluation was appropriate for 2015.

Evaluation Findings

Impact Evaluation Results

The following sections present the findings from each impact evaluation activity.

Simulation Model Review

To analyze the parameter value input assumptions used to develop savings in the TRM, the Team reviewed the simulation model that serves as the basis for measure savings. Overall, the simulation workbooks were well organized and we were able to track calculations from the model inputs to the TRM tables. In reviewing the simulation model, we sought to confirm the existence and reasonableness of the baseline inputs, airflow parameter, duct leakage parameter, cooling and heat pump SEER values, and knee wall square footage. Detailed findings from the simulation model review include:

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- The implementer's baseline inputs were reasonable and the four input sources were commonly used and appropriate.
- The Team located airflow inputs in the model; however, the final parameter values for the airflow infiltration rates appear high for existing Arkansas homes. Table 77 provides the model's air sealing values by climate zone.

Table 77. HPwES Simulation Model Airflow Infiltration Rates

Model City	AR Climate Zone	ACH50 in Modeling
El Dorado	6	30.3
Little Rock	7	26.7
Fort Smith	8	25.8
Fayetteville	9	27.3

The Cadmus Team compared these values to participant data for both EAI and SWEPCO residential programs offering air sealing in 2014 and 2015, and determined that the mean test values before air-sealing were between 16 and 18 ACH50. These test values are more appropriate than the modeled ACH50 because they are based on program participant values taken from a large sample of Arkansas homes.

Table 78. HPwES Participant Data Air Infiltration Rates

Model City	Number of Homes Sampled	AR Climate Zone	Average ACH50 Value
El Dorado	2,176	6	16.7
Little Rock	3,024	7	18.4
Fort Smith	682	8	16.9
Fayetteville	810	9	16.5

- Duct leakage is a significant issue in Arkansas home performance. The typical baseline parameter for duct sealing in the model is 20% of system airflow (derived from ENERGY STAR).[33] While this is a reasonable value for existing systems, it is difficult to obtain exact detail for this parameter and it is difficult to model. Cadmus tested data from participant systems between 2014 and 2015 in relevant EAI and SWEPCO programs, which revealed approximately 300-360 CFM25 leakage for homes with an average cooling size of 2.6-3.0 tons. Assuming 400 CFM/ton system flow, this implies about 30% leakage. However, this value does not account for homes with entirely internal duct systems that are consequently not tested for leakage or have a leakage value of zero. While our findings from this review indicate that the assumed 20% leakage derived from ENERGY STAR is reasonable based on current data, this parameter has a

[33] ENERGY STAR, Duct Sealing, EPA 430-F-09-050. "Leaky ducts can reduce heating and cooling system efficiency by as much as 20 percent." February 2009. Accessed January 2016. https://www.energystar.gov/ia/products/heat_cool/ducts/DuctSealingBrochure04.pdf

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large impact on all measure savings derived from modeling, so further study of duct leakage is warranted.

- The model assumes a typical 10 SEER cooling for central air conditioning and 11.5 SEER for heat pumps. The Team generally assumes the same SEER for both existing system types, since historically both system types have been subject to the same federal minimum efficiency standard for cooling.[34]
- The calculation of energy savings for knee walls appears to be incorrect. The area in the model is 304 square feet, while the Cadmus Team determined via input sketch that the knee wall area should be 152 square feet. This correction would roughly double the energy savings for insulating knee walls (the current TRM calculation doubles the applied area of the insulation, which incorrectly reduces the savings per square foot).

Database and Document Review

The Cadmus Team reviewed a census of program-reported tracking data in July 2015 and in January 2016 to ensure that the implementer correctly applied TRM 5.0 inputs and assumptions for calculating savings. We tested the data to ensure all calculations and assumptions were complete and present. Overall, the HPwES Program data appeared well organized; however, we identified issues in the tracking data that need additional modifications to be consistent with TRM 5.0 (outlined below):

Advanced Power Strips

The Team evaluated advanced power strips installed in participating homes using TRM 5.0 algorithms. We calculated *ex post* energy savings and demand reduction and found no discrepancies in the *ex ante* savings. Both energy savings and demand reduction received 100% realization rates.

Air Sealing

Trade allies check whether a home needs air sealing by conducting a blower door test to determine if significant improvements can be made. After they repair and seal identified leaks, trade allies retest the home to quantify the improvement achieved. Cadmus evaluated this measure using TRM 5.0. We calculated *ex post* energy savings and demand reduction and found no discrepancies in the *ex ante* savings. Both energy savings and demand reduction received 100% realization rates.

Central Air Conditioner Replacement

The Cadmus Team evaluated new air conditioners exceeding the federal minimum efficiency standard using TRM 4.0 algorithms. The program implementer calculated *ex ante* energy saving using TRM 4.0 because TRM 5.0 requires new data elements that they did not capture prior to adopting TRM 5.0, including equipment age and installation disposition. In our review, we found one project with incorrect

[34] U.S. Department of Energy. *Appliance and Equipment Standards Rulemakings and Notices.* (energy conservation standards for residential central air conditioners and heat pumps). Accessed January 2016. https://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/75.

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savings from the TRM. That single error in the tracking database resulted in a 99% realization rate for energy savings and 100% realization rate for demand reduction.

CFL

Cadmus evaluated energy-efficient compact fluorescent lamps installed in participating homes using TRM 5.0 algorithms. We calculated *ex post* energy savings and demand reduction and found no discrepancies in the *ex ante* savings. Both energy savings and demand reduction received 100% realization rates.

Duct Sealing

Program trade allies determine the need for duct sealing by conducting a duct leakage test to determine if significant improvements can be made. After repairing and sealing the ducts, the trade ally re-tests the system to determine how much improvement was achieved. Cadmus evaluated this measure using TRM 5.0. During our review we found a minor inconsistency inside the TRM regarding the appropriate heating degree days for climate zone 9. We found the program implementer had made a reasonable interpretation of the TRM and applied correct heating degree days.

Additionally we found one project with a gas furnace heating system and window air conditioners. For this project, we determined that duct sealing electric savings are not applicable since the cooling system is not tied to the duct systems. We calculated a 100% realization rate for *ex post* energy savings and a 100% realization rate for demand reduction.

Faucet Aerators

The Team evaluated low-flow faucet aerators in homes with electric water heating using TRM 5.0 algorithms. We calculated *ex post* energy savings and demand reduction and found no discrepancies in the *ex ante* savings. Both energy savings and demand reduction received 100% realization rates.

Heat Pumps Replacement

The Team evaluated ENERGY STAR-qualified heat pumps that exceeded federal standards using TRM 4.0. The program implementer calculated e*x ante* energy saving using TRM 4.0 because TRM 5.0 requires data elements they did not capture prior to the adopting TRM 5.0, including equipment age and installation disposition. Upon calculating *ex post* energy savings and demand reduction, we found no discrepancies in the *ex ante* savings. Both energy savings and demand reduction received 100% realization rates.

Ceiling Insulation

The Team evaluated ceilings with inadequate insulation that were insulated to at least R-38 using TRM 5.0 algorithms. We calculated *ex post* energy savings and demand reduction and found slight differences in the *ex ante* savings. The Team interpolated energy savings between TRM tables 77 and 78. This only effected projects with ceiling insulation levels between R-38 and R-49. The Team calculated a 101% realization rate for energy and a 102% realization rate for demand reduction.

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Wall Insulation

The Team evaluated walls with no or ineffective insulation that were insulated to at least R-13 using TRM 5.0 algorithms. We calculated *ex post* energy savings and demand reduction and found no discrepancies in the *ex ante* savings. Both energy savings and demand reduction received 100% realization rates.

Low-Flow Showerheads

The Team evaluated low-flow showerheads in homes with electric water heating using TRM 5.0 algorithms. We calculated *ex post* energy savings and demand reduction and found several discrepancies in the *ex ante* savings. We contacted the program implementer to discuss these discrepancies and discovered several measures with incorrect values in the database. The corrected energy savings resulting in a 98% realization rate and demand reduction resulted in a 97% realization rate.

Water Heater Jacket

The Team evaluated the water heater on homes receiving this measure in 2015 with electric heating that had an insulated blanket installed on the outside of the tank using TRM 5.0 algorithms. We calculated *ex post* energy savings and demand reduction and found no discrepancies in the *ex ante* savings. Both energy savings and demand reduction received 100% realization rates.

Pipe Insulation

The Team evaluated insulation installed on hot water piping in homes with electric water heating using TRM 5.0 algorithms. We calculated *ex post* energy savings and demand reduction and no discrepancies with *ex ante* energy savings and demand reduction. Both energy savings and demand reduction received 100% realization rates.

Based on the calculations of *ex post* savings for all completed projects (as described above) using inputs and assumptions from the TRM 5.0, Cadmus determined that total *ex post* HPwES Program gross energy savings was 1,997 MWh, and demand reduction was 653.7 kW. Table 79 and

Table 80 show the final *ex ante* and *ex post* gross energy savings and demand reduction estimates, respectively.

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Table 79. 2015 HPwES Program *Ex Ante* and *Ex Post* Gross Energy Savings

Measure	Quantity	*Ex Ante* Gross Energy Savings (MWh)	*Ex Post* Gross Energy Savings (MWh)	Realization Rate
Advanced Power Strip	47	11.9	11.9	100%
Air Sealing	821	331.3	331.3	100%
Central AC Replacement	25	15.0	14.9	99%
CFL	8,437	205.4	205.4	100%
Duct Improvement	854	1,285.6	1285.6	100%
ES Window	28	19.4	19.4	100%
Faucet Aerator	198	10.0	10.0	100%
Heat Pump Replacement	3	5.7	5.7	100%
Insulation - Ceiling	86*	51.9	52.2	101%
Insulation - Wall	1*	1.6	1.6	100%
Showerhead	163	40.4	39.5	98%
Water Heater Jacket	32	2.9	2.9	100%
Water Heater Pipe Insulation	203	0.3	0.3	100%
Total	**10,898**	**1,981.3**	**1,980.7**	**100%**

Table 80. 2015 HPwES Program *Ex Ante* and *Ex Post* Gross Demand Reduction

Measure	Quantity	*Ex Ante* Gross Demand Reduction (kW)	*Ex Post* Gross Demand Reduction (kW)	Realization Rate
Advanced Power Strip	47	1.4	1.4	100%
Air Sealing	821	87.7	87.7	100%
Central AC Replacement	25	9.0	8.9	99%
CFL	8,437	31.7	31.7	100%
Duct Improvement	854	469.7	469.2	100%
ES Window	28	11.7	11.7	100%
Faucet Aerator	198	1.0	1.0	100%
Heat Pump Replacement	3	1.0	1.0	100%
Insulation - Ceiling	86	35.9	36.4	102%
Insulation - Wall	1	0.2	0.2	100%
Showerhead	163	4.3	4.1	97%
Water Heater Jacket	32	0.2	0.2	100%
Water Heater Pipe Insulation	203	0.0	0.0	100%
Total	**10,898**	**653.8**	**653.7**	**100%**

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Table 81 and Table 82 provide the 2014 and 2015 *ex post* gross energy savings and demand reduction estimates, respectively.

Table 81. HPwES Program *Ex Post* Gross Energy Savings by Measure and Program Year

Measure	2014 *Ex Post* Gross Energy Savings (MWh)	2015 *Ex Post* Gross Energy Savings (MWh)	Percentage Change 2014-2015
Advanced Power Strip	N/A	11.9	N/A
Air Sealing	305.1	331.3	9%
Central AC Replacement	1.5	14.9	893%
CFL	207.5	205.4	-1%
Duct Improvement	1,056.20	1,285.6	22%
ES Window	N/A	19.4	N/A
Faucet Aerator	13.5	10	-26%
Heat Pump Replacement	N/A	5.7	N/A
Insulation - Ceiling	7.9	52.2	561%
Insulation - Wall	N/A	1.6	N/A
Showerhead	67.9	39.5	-42%
Water Heater Jacket	5.9	2.9	-51%
Water Heater Pipe Insulation	2.4	0.3	-88%
Total	**1,667.9**	**1,980.7**	**19%**

Table 82. HPwES Program *Ex Post* Gross Demand Reduction by Measure and Program Year

Measure	2014 *Ex Post* Gross Demand Reduction (kW)	2015 *Ex Post* Gross Demand Reduction (kW)	Percentage Change 2014-2015
Advanced Power Strip	N/A	1.4	N/A
Air Sealing	63.9	87.7	37%
Central AC Replacement	0.8	8.9	1013%
CFL	31.5	31.7	1%
Duct Improvement	289.3	469.2	62%
ES Window	N/A	11.7	N/A
Faucet Aerator	1.4	1	-29%
Heat Pump Replacement	N/A	1	N/A
Insulation - Ceiling	3	36.4	1113%
Insulation - Wall	N/A	0.2	N/A
Showerhead	7.1	4.1	-42%
Water Heater Jacket	0.4	0.2	-50%
Water Heater Pipe Insulation	0.3	0	-100%
Total	**397.7**	**653.7**	**64%**

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Evaluated Gross Demand Reduction and Energy Savings

The Cadmus Team estimated *ex post* gross energy savings of 1,980 MWh, which resulted in a realization rate of 100% (see
Table 80).

Table 83. HPwES Program *Ex Ante* and *Ex Post* Gross Energy Savings

Ex Ante Gross Energy Savings (MWh)	*Ex Post* Gross Energy Savings (MWh)	Realization Rate
1,981	1,980	100%

The Team estimated *ex post* gross demand reduction of 653.7 kW, which resulted in a realization rate of 100% (see Table 84).

Table 84. HPwES *Ex Ante* and *Ex Post* Gross Demand Reduction

Ex Ante Gross Demand Reduction (kW)	*Ex Post* Gross Demand Reduction (kW)	Realization Rate
653.8	653.7	100%

NTG Results

In 2014, the Team calculated a program-specific NTG based on freeridership and spillover research conducted in that year. The Cadmus Team applied the 2014 HPwES Program NTG of 97% to 2015 program *ex post gross* savings. Table 85 shows the final evaluated NTG ratio for HPwES of 97%. Applying this ratio resulted in *ex post* net energy savings of 1,921 MWh and a demand reduction of 634 kW (Table 85).

Table 85. Evaluated Net Savings

Metric	*Ex Post* Gross*	*Ex Post* Net*	NTG
Energy Savings (MWh)	1,980	1,921	97%
Demand Reduction (kW)	654	634	97%

* The gross and net energy savings and demand reduction are presented without line loss.

Process Evaluation Summary

As noted above, the Cadmus Team conducted a condensed process evaluation in 2015. As such, our data collection activity consisted only of year-end interviews with the HPwES program and implementation managers.

Program Performance

As discussed in the 2015 Performance section, after two initial years of underperformance, HPwES experienced a critical turning point in 2014, with the number of completed projects increasing by more than 300%, from 246 in 2013 to 1,005 in 2014. Although the number of completed projects decreased to 847 in 2015, SWEPCO installed more measures and achieved higher savings per project, increasing the average project kWh savings by 43% in comparison to 2014 (see Figure 43).

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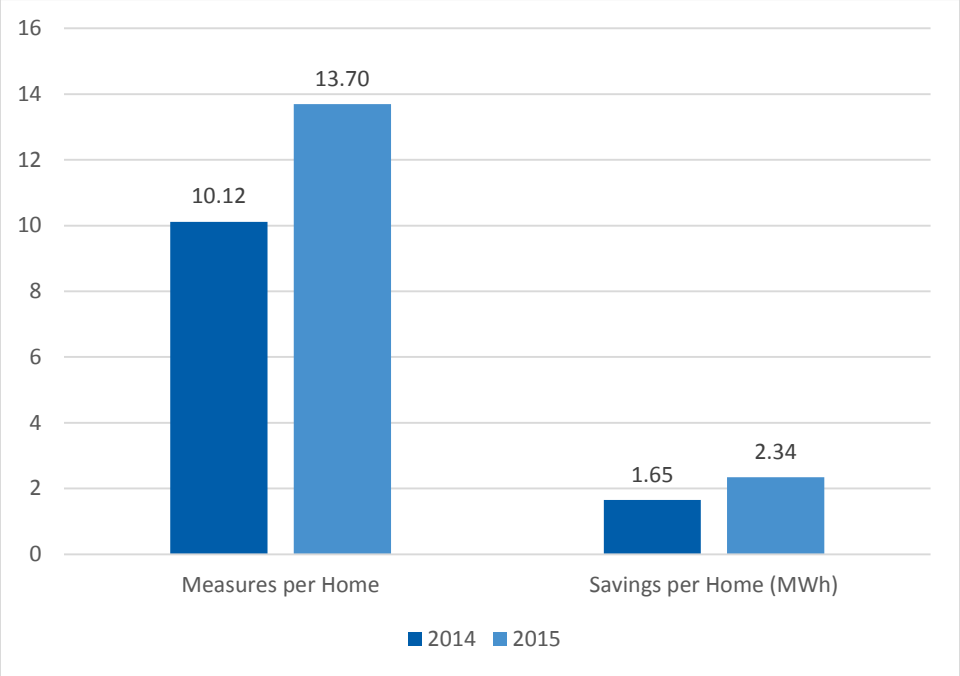
Trade Ally Engagement

Program staff reported making changes to the way they manage the project pipeline in 2015 in response to lessons learned in 2014. For example, high participation early in 2014 quickly depleted the program budget. In 2015, program staff reported launching a monthly allotment system for active contractors that helped to ensure year round program availability and effectively eliminated the rush to submit project applications early in the year for fear that the incentives would not be available later in the year. At the beginning of the program year, the implementer assigned trade allies to a monthly allotment of houses based on their 2014 activity level. If necessary, staff were able to adjust this allotment monthly. Additionally, program staff created a new top tier bonus of $100 per project for trade allies that achieved the highest tier of leakage reduction on both duct and air sealing, encouraging them to achieve the most savings possible per home. Trade allies reported to staff that the new incentive allowed crew leaders to justify spending more time on each house. As a result, the average number of measures installed per home increased by 35% and the average savings per household increased by 42% from 2014 to 2015 (see Figure 43).

Figure 43. Average Measures Installed and Savings per Home, 2014 and 2015



In 2015, HPwES Program staff provided ongoing support to trade allies by offering three training sessions on best practices and measure-specific technical topics. In 2014, implementation staff had reported that a lack of local academic training locations presented an obstacle to providing ongoing training, and in 2015 this problem persisted; however, the implementers overcame the issue by finding new spaces and by having a staff member who is a Building Performance Institute certified contractor provide trade allies with informal, on-site training. The implementer noted that one positive unintended

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consequence of not having academic training locations is the ability to provide trainings that are tailored to the HPwES Program instead of following a set academic curriculum. SWEPCO also provided scholarships to three contractors to attend the Affordable Comfort Institute Home Performance Conference.

A primary focus in 2015, according to program and implementation staff, involved readying trade allies for changes to contractor eligibility requirements anticipated in 2016 with the transition to the Consistent Weatherization Approach. The weatherization program requires participating trade allies to be capable of installing all measures covered by the program. In 2015, staff began encouraging contractors who did not have all the required skills to partner up with other contractors to meet this new 2016 eligibility requirement. Additionally, the implementer asked trade allies interested in participating in 2016 to complete a request for qualification as a way of ensuring that they understood the upcoming changes to trade ally eligibility.

Communication

Program and implementation staff reported that their ease of communication with one another contributed to program success. Staff noted continued good relationships between program and implementation staff, as well as between the implementer and the trade allies, with all parties communicating regularly. Program and implementation staff agreed that the communication and outreach to trade allies continued to be very effective in 2015, although the number of participating trade allies decreased from 10 in 2014 to seven in 2015. The implementer reported that 13 trade allies signed up to participate in 2016, although some will likely drop out over the course of the program year.

Customer Outreach

Staff employed a wide variety of marketing tactics in 2015, including billboards, direct mail, bill inserts, and radio, as well as the company website. The implementer also provided marketing assistance to trade allies in the form of door hangers and yard signs. Staff reported observing an apparent increase in customer awareness. For example, the implementer noticed at outreach events that customers mention they have heard of the program and are now seeking it out.

Progress on Implementation of Recommendations

Table 86 lists the status of the 2014 recommendations for the HPwES Program. SWEPCO has completed all HPwES recommendations to date.

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Table 86. Status of 2014 HPwES Program Recommendations

Year	Recommendation	2015 Status
2014	Explore alternative local training locations, such as arranging for a mobile laboratory from Pulaski Technical College.	***Completed***. Staff were able to improvise new training locations and increase ad-hoc, informal on-site training of trade allies.
2014	The implementer should review measure savings calculations with the Cadmus Team at least once during the 2015 program year to ensure that all data/calculation issues have been resolved.	***Completed.*** The Cadmus Team identified fewer errors in measure savings calculations in 2015.

2015 Conclusions and Recommendations

In 2015, HPwES had another successful year. Program and implementation staff have repeatedly made informed program changes, which have paid off and helped ramp up performance considerably over its first two years of operation. In program years 2014 and 2015, HPwES exceeded both participation and energy savings targets.

Conclusion: In reviewing the simulation model, the Cadmus Team found a number of areas where parameters likely do not reflect actual conditions.

Recommendation: The Team recommends making the following adjustments to the simulation model:

- Update the simulation model air leakage values for each climate zone based on participant data to more accurately reflect conditions in Arkansas. See Table 87 for recommended values per climate zone.

Table 87.Recommend Infiltration Rates For Modeling

Model City	AR Climate Zone	Average ACH50 Value
El Dorado	6	16.7
Little Rock	7	18.4
Fort Smith	8	16.9
Fayetteville	9	16.5

- Update the SEER value for both air conditioners and air-source heat pumps based on the most recent Energy Information Administration Residential Energy Consumption Survey (RECS) data or other relevant data source.
- Amend the calculation for determining energy savings and demand reduction for knee wall measures using the correct square footage defined in the simulation model.

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Recommendation: The Cadmus Team recommends updating the calculations to TRM 5.0 for ceiling insulation, air conditioning, and heat pump measures. Additionally, the Team recommends updating the energy savings calculation for air-source heat pumps with the following equation.

$$kWh_{heat} = \frac{CAP_H \times EFLH_H \times (\frac{1}{HSPF\ base} - \frac{1}{HSPF\ post})}{1{,}000}$$

Recommendation: The Cadmus Team recommends recording water heater location in the tracking data. Based on the water heaters being located inside a conditioned space, we determined a realization rate of 100%.

Conclusion: In 2015, the average per-project energy savings increased by 43% over 2014, which demonstrates that the HPwES Program was able to achieve deeper savings per household. This may be partially attributed to the addition of the top tier bonus, intended to encourage trade allies to achieve deeper savings from each household.

Conclusion: Program and implementation staff made a concerted effort in 2015 to prepare trade allies for the substantial changes anticipated in 2016 due to the introduction of a Consistent Weatherization Approach. While the implementer offered a number of trainings in preparation, the requirement that trade allies offer all program measures means that technical training will still be necessary to fill any knowledge gaps.

Recommendation: Ensure that targeted professional certification courses are offered and trade ally feedback is sought regularly to monitor their transition to the new program.

Conclusion: TRM 5.0 Section 2.2 discussing envelope measures, refers to Rogers weather data as the most representative of climate zone 9. Because two different values are given for climate zone 9 (Volume 2, Table 1 and in Appendix C), both the implementer and Cadmus used an average of two values in calculating energy savings for weather-sensitive measures installed in climate zone 9.

Recommendation: If the TRM advice about climate zone 9 is intended to apply to all weather sensitive measures, the statement in section 2.2 should be moved prior to Volume 2, Table 1. In the future, the implementer should use weather data from Rogers to calculate energy savings for weather-sensitive measures installed in climate zone 9.

Conclusion: Duct leakage directly effects the energy saving for each modeled measure, but the current data is inconclusive. A 10% increase or decrease in duct leakage has the same direct effect on the energy and demand savings for any measures in the TRM where simulation was used to develop the savings. Our comparisons of program participant data have been inconclusive since the only data available is from participants who received duct sealing; meaning the duct system in those homes was leaky enough to warrant testing and duct sealing, leaving an unknown portion of homes uncategorized.

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Recommendation: The Cadmus Team recommends adding a data collection field in the tracking data for each home in the program, regardless of whether duct sealing was performed, to document the location of the duct system, whether the ducts were tested, and the duct leakage value in its existing condition. These additional data points will allow the evaluator to characterize the duct system in every home that passes through the program, improving the accuracy of savings calculations for this measure.

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Appendix A: Evaluation Methodology

For the 2015 evaluation methodology, the Cadmus Team drew on multiple data collection, review, and analysis methods. We conducted customized program-level evaluation activities and captured economies-of-scale by capitalizing on similar tasks across multiple programs or customer sectors. As our evaluation is a joint effort for SWEPCO and Entergy Arkansas, we combined some data collection activities across companies for efficiency and to determine any broadly applicable insights; however, in these cases, we applied and reported findings exclusively to the applicable utility and/or program.

Comprehensiveness

In Order No. 17 of Docket No 08-144-U, the APSC set forth a *Comprehensiveness Checklist* that it uses to determine whether a utility's energy efficiency portfolio is comprehensive under the C&EE Rules. As part of evaluating SWEPCO's programs, the Team analyzed the programs' success in achieving the goals and objectives established by the *Comprehensiveness Checklist* at a portfolio level. As in prior years, we used both qualitative and quantitative techniques as appropriate and drew on portfolio-level trends and preponderances to assess compliance with each factor, rather than focusing on individual program-specific accomplishments.

Building off previous full evaluations of the *Comprehensiveness Checklist,* we focused the 2015 evaluation on new activities SWEPCO implemented to enhance the portfolio comprehensiveness or to address deficiencies identified in 2014. To facilitate this assessment, the Team updated the comprehensiveness tool we used in prior years with new findings based on 2015 research. Where programs achieved high marks for comprehensiveness in 2012, 2013, and 2014, and for programs that met the TRM 5.0 Protocol C guidelines for a condensed process evaluation, the Team conducted a less rigorous comprehensiveness assessment in 2015, focusing on key areas identified for improvement or where the analysis is likely to provide useful guidance relative to future program planning. The Cadmus Team assessed data regarding **Factor 2** (budgetary, management, and program delivery resources) and **Factor 6** (cost-effective energy efficiency) exclusively for the 2015 program year, as results from 2014 do not necessarily carry over into 2015.

Impact Evaluation

To evaluate program impacts, the Cadmus Team adjusted program-reported gross savings using the information we gathered through databased and document reviews, engineering reviews of tracking data and project work papers, TRM 5.0 deemed savings calculation reviews, on-site verification and metering, baseline deemed estimation, and load data analysis, as appropriate. The Team based specific procedures for estimating energy savings and demand reduction on each program's design, delivery approach, and the types of measures offered. Table 88 presents Cadmus' 2015 impact evaluation activities for each program.

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Table 88. 2015 Impact Evaluation Tasks

Program	Database and Document Review	Engineering Desk Review/Modeling Review	TRM Deemed Savings Calculations Review	On-Site Verification and Metering	Baseline Demand Estimation	Load Data Analysis
CIEEP	●	○	●	●	○	○
RLP	●	○	●	○	○	○
RSOP	●	●	●	○	○	○
SBDI	●	●	●	○	○	○
LMSOP	●	○	○	○	●	●
RESAP	●	○	●	○	○	○
HPwES	●	●	●	○	○	○

Key: ● = Conducted; ○ = Not conducted

Note: the Team used data from the surveys and interviews to support program impact evaluations.

The following sections describe the Team's general evaluation methodologies. See program sections for program-specific methodological details.

Database and Document Review

Cadmus reviewed SWEPCO's program tracking databases, monthly status reports, and other documentation to assess the quality of information and the presence of anomalous entries, outliers, duplicates, and missing values. This included reviewing all data fields recommended in TRM 5.0 Protocol A and those necessary to calculate deemed saving per the TRM 5.0 Volume 2. Specific activities included:

- Verifying that all customer and vendor information needed to conduct primary research was available and complete.
- Confirming that all measure-specific data included the necessary details in the proper formats to enable impact evaluation, taking into consideration SWEPCO's ability to collect the data needed to comply with any retroactive TRM 5.0 adjustments.
- Confirming that all program costs and other tracking information required to calculate impacts and assess resource allocation were available and complete.
- Assessing marketing and outreach materials and activities.
- Reviewing savings calculation work papers, where existing, for a census or sample of rebated measures, as appropriate, paying particular attention to calculation procedures and documentation for savings estimates.

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For measures not included in TRM 5.0, the Team reviewed documentation (e.g., audit reports, savings calculation work papers) from a sample of energy efficiency project sites. We paid particular attention to the calculation procedures and savings estimate documentation. We also verified the appropriateness of the implementers' analyses for calculating savings, as well as SWEPCO and implementers' assumptions concerning participating facilities' structural attributes and operational characteristics.

As noted in Table 88, the Team conducted a database and document review for all programs.

Engineering Desk Review of TRM Measure Savings Algorithm

Cadmus compared the program tracking data with the TRM 5.0 savings algorithms to verify both the inputs and correct use of the algorithms. As the first step of this review, the Team identified all assumed inputs for each TRM 5.0 algorithm (e.g., average water main temperature by weather zone), as well as installation-specific values (e.g., R-values, change in CFM, wattage, thickness of tank wrap). Next, we confirmed that the program tracking data contained all installation-specific inputs required to successfully calculate savings for each measure. We then identified any missing required inputs and coordinated with SWEPCO and/or its implementers to determine whether these inputs existed and/or whether they had made other assumptions regarding these inputs. After we acquired all the data inputs, the Team replicated measure-level savings calculations and provided a realization rate, which is the ratio of claimed (*ex ante*) savings to verified (*ex post*) savings. Please refer to Table 88 for a list of the programs that received an engineering desk review.

Modeling Review

To evaluate savings claims for insulation and sealing installed in the HPwES Program, the Cadmus Team reviewed the simulation model (in BeOpt) that serves as the basis for measure savings in the TRM. The Team performed a technical review of the parameters used in all of the whole-house baseline and as-built models. By means of this comprehensive review, Cadmus assessed the reasonableness of the modeled savings, checked for consistency across various building prototypes, and evaluated the accuracy of an average home's characteristics in Arkansas. We also made sure that a unified set of assumptions were maintained when modeling across different climate zones for a single measure type.

TRM Deemed Savings Calculation Review

For prescriptive measures, the Team verified and compared the claimed savings estimates in the tracking database to the values in the TRM 5.0 to verify the accuracy of inputs and correct application of savings algorithms. We used evaluation methodologies consistent with protocols established in TRM 5.0 Volume 1 and drew on the savings values, algorithms, and methodologies described in TRM 5.0 Volume 2. Two examples of these evaluation methods are:

- Using the TRM 5.0 baseline values unless direct experience dictates that the TRM 5.0 baseline is no longer appropriate.
- Using the deemed values and algorithms established in the TRM 5.0, where appropriate, and otherwise following TRM Protocol D2 (M&V Protocols), which is based on International Performance Measurement and Verification Protocols®.

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The Cadmus Team referred to the algorithms and inputs specified in TRM 5.0 where tracking data were sufficient to support its use and where data values specific to SWEPCO's service territory were not available. Where the Team collected market, measure, site, and project data for measures installed through SWEPCO's programs, we recommend regionally specific updates to the parameter values for TRM 6.0.

In some cases, we substituted primary data or used TRM 4.0 algorithms and inputs if those required by TRM 5.0 were not available. In these cases, the Team documented all deviations from TRM 5.0 in the portfolio findings section of the main report.

Refer to Table 88 for a list of the programs that received a TRM deemed savings calculation review.

On-Site Measure Verification and Metering

Cadmus conducted on-site measure verification and metering for the CIEEP. See program section for details.

Load Data Analysis

The Team conducted load data analysis for the LMSOP. See program section for details.

Baseline Deemed Estimation

The Cadmus Team conducted baseline deemed estimations for the LMSOP. See program section for details.

Net-to-Gross

The Team conducted rigorous data collection and analysis of freeridership and spillover to support NTG calculations in 2012, 2013, and 2014. For the 2015 evaluation, we relied on these previous efforts for several programs. Table 89 shows the NTG method we applied to each program based on assessing specific program needs and the availability of accurate, existing information in 2015.

Table 89. 2015 NTG Approach by Program*

Program	2014 Assigned Value	Literature Review	Stipulated Value	New NTG Calculation	
				Primary Data Collection	Demand Elasticity Model
CIEEP	○	○	○	●	○
RLP	○	○	○	○	●
RSOP	●	○	○	○	○
SBDI	●	○	○	○	○
LMSOP	○	○	●	○	○
Appliance		●	○	○	○
HPwES	●	○	○	○	○

* Key: ● = Conducted; ○ = Not conducted

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The following sections describe the Team's general evaluation methodologies. See program sections for program-specific methodological details.

Blended 2013 and 2014 Value

For programs where the Team conducted primary data collection and analysis in the two prior evaluation years (i.e., 2013 and 2014), we blended the NTG ratios and calculated a weighted average value to apply to 2014 savings. Although we blended the NTG at a program level, we reviewed the proportion of savings by measure type to determine whether program design or measure uptake changes indicated a need to revise NTG estimates. We used this approach to derive NTG values for the RSOP, SBDI, and HPwES Programs.

Stipulated Value

As in prior years, the Cadmus Team applied a stipulated value of 1.0 to the LMSOP, as the design of demand response programs does not allow freeridership to occur.

Literature Review

In accordance with TRM 5.0 Protocol F, for the RESAP, the Team conducted a literature review to identify similar programs operating in jurisdictions with similar market conditions to those in SWEPCO's territory. We calculated an average of NTG values from similar programs, which we applied to measures installed in the RESAP.

Primary Data Collection (Freeridership/Spillover)

For CIEEP, the Team conducted new analyses to calculate NTG, specifically primary data collection, via participant surveys, which allowed us to estimate freeridership and spillover. We calculated net savings by multiplying the ratio determined from the equation below by the gross program savings.

$$NTG = 1 - Freeridership + Spillover$$

Freeridership Methods

We estimated freeridership based on four general question categories: prior plans for measure installation, available budget, program influence, and stated intent. Because the Arkansas TRM does not allow for partial freeriders, we divided respondents into the following two groups based on their responses:

- ***Full freeriders (100%)*** are participants who would have installed the same energy efficiency measures in the absence of the program.
- ***Non-freeriders (0%)*** are participants who would not have installed any of the energy-efficient measures within one year of program participation.

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To be classified as a full freerider, respondents must simultaneously meet the following three criteria:

- Indicate the presence of specific pre-existing plans to purchase or install the measure prior to learning about the program
- Indicate that their budget could have accommodated the full cost of the measure
- Indicate that in the absence of the program, they would have taken the same action as they did through the program within one year

To be classified as a non-freerider, respondents must meet any one of the following criteria:

- Indicate the absence of specific pre-existing plans to purchase or install the measure prior to learning about the program
- Indicate that at least one program element was extremely influential (highest rating) to their decision to purchase or install the measure
- Indicate that in the absence of the program, they would have taken no action within one year

We combined all of the respondent-specific freeridership rates to determine the overall amount of freeridership for a program.

Table 90 shows the survey questions used to assess freeridership for each criterion. Cadmus used the three freeridership criteria scores to determine overall program freeridership.

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Table 90. C&I Solutions Program Participant Freeridership Questions

Freeridership Criteria	Survey Question Number	Survey Question Wording
Prior Plans for Measure Installation	Q8/Q13	Before learning about EAI's C&I Solutions Program, was your organization already planning to purchase and install the measure in 2015?*
Available Budget	Q9/Q15	If the program incentive had not been available, how likely is it that your 2015 budget would have included the full cost of the measure?*
Stated Intent	Q11/Q19	Without the incentive, would you have purchased the measure at all, and if so, would it be the same level of efficiency, higher efficiency, or lower efficiency
	Q12/Q22	Without the incentive, would you have purchased the measure …[sooner; at the same time; later in the same year; in one or two years; etc.]?

* Question wording varied slightly depending on the number of measures installed by the contractor.

Spillover Methods

The Cadmus Team measured spillover for each program based on three general question categories: installations of additional measures, absence of incentives, and program influence. We investigated the following two distinct forms of spillover:

- ***Like spillover**:* for equipment installed outside the program that is exactly the same type and efficiency as the equipment installed through the program. This can be assessed for both participants and nonparticipants.
- ***Non-like spillover**:* for equipment installed outside the program that is not exactly the same type and efficiency as the equipment installed through the program. This can only be assessed for participants.

The Team combined this spillover information with additional data we derived from surveys and interviews to develop final NTG ratios.

Lighting: Econometric Demand Elasticity Modeling Model

The Cadmus Team developed a DEM using program data on prices, the number of lamps purchased, and lamp and retailer characteristics. We estimated freeridership using the following equation:

$$FR\ Ratio = \frac{\sum_i^n \left(E\left[bulbs_{NOPROG_i}\right] * Gross\ kWh_i\right)}{\sum_i^n \left(E\left[bulbs_{PROG_i}\right] * Gross\ kWh_i\right)}$$

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Where:

$E[bulbs_{NOPROGi}]$	=	The expected number of lamps of type 'i' that would be purchased in absence of the program (as predicted by setting the model price to original retail levels) and zero retail displays
$Gross\ kWh_i$	=	The gross energy savings for lamp type 'i.'
$E[bulbs_{PROGi}]$	=	The expected number of lamps of type 'i' purchased with program pricing (as predicted by the DEM)

Available pricing data for all lamp types—with and without program incentives—allowed the Team to use price and sales variations within the program period as the basis for the DEM.

Model Specification

The Cadmus Team modeled the data as a panel, modeling a cross-section of program bulb quantities over time as a function of prices, promotional events, and retail channels. This involved testing a variety of specifications to ascertain price impacts—the main instrument affected by the program—on bulb demand. The Team estimated the following basic equation for the model (for bulb model *i*, in month *t*):

$$\begin{aligned}\ln(Q_{it}) = \sum_{\pi}\left(\beta_{\pi} Retailer\ Store_{\pi,\mathrm{i}}\right) \\ + \sum_{\theta}\left(\beta_{\theta 1}\left[ln(P_{it}) * (Retail\ Channel_{\theta,\mathrm{i}}) * (Measure_{\theta,\mathrm{i}}) * (Bulb\ Type_{\theta,\mathrm{i}})\right]\right) \\ + \sum_{\theta}\left(\beta_{\theta 3}\left[ln(P_{it}) * (Specialty_{\theta,\mathrm{i}})\right]\right) \\ + \sum_{\theta}\left(\beta_{\theta 4}\left[Off\ Shelf\ Placement * (Measure_{\theta,\mathrm{i}}) * (Lumen\ Bin\ Type_{\theta,\mathrm{i}})\right]\right) \\ + \alpha(Retail\ Channel_{\theta,\mathrm{i}}) * Month_t + \varepsilon_i + \gamma_t\end{aligned}$$

Where:

ln	=	Natural log
Q	=	Quantity of bulb *i* sold during month *t*
P	=	Retail price per bulb (after markdown) of bulb *i* in month *t*
Retail Channel	=	Retail category (do-it-yourself (DIY), mass-market, or hard-to-reach)
Measure	=	Product category (CFL or LED)
Lumen Bin Type	=	Standard, specialty, reflector
Bulb Type	=	Combination of lumen bin type and baseline wattage
Off-shelf Placement	=	A dummy variable equaling 1 if a bulb was featured in an off-shelf merchandising display (end cap, pallet display, wing stacks, etc.); 0 otherwise
RetailerStore	=	Dummy variable equaling 1 for each unique retailer and store number; 0 otherwise

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MonthID	=	A dummy variable equaling 1 for each month of the program year; 0 otherwise
ε_{it}	=	Cross-sectional random-error term
γ_{it}	=	Time-dependent random error term

The model specification assumed a negative binomial distribution, which served as the best fit of the plausible distributions (e.g., lognormal, poisson, negative binomial, or gamma). The negative binomial distribution provides accurate predictions for a small number of high volume sale bulbs, while the other distributions predict sales for those bulbs. We checked the model's representativeness using three criteria:

1. Data Adequacy – an appropriate number of sample points
2. Data Representativeness – an appropriate mix of lamp types and retailers
3. Model Accuracy – verified by mapping actual values to model-predicted values

Using the following criteria, the Team ran numerous model scenarios to identify the one with the best parsimony and explanatory power:

- Model coefficient p-values (keeping values less than <0.1)[35]
- Explanatory variable cross-correlation (minimizing where possible)
- Model Akaike's Information Criteria (AIC) (minimizing between models)[36]
- Minimizing multicollinearity
- Optimizing model fit.

See the program section for additional details and findings.

[35] Where a qualitative variable had many states (such as bulb types), the Team did not omit variables if one states was not significant, but rather considered the joint significance of all states.

[36] The Team used AIC to assess model fit, as nonlinear models do not define the R-square statistic. AIC also offers a desirable property in that it penalizes overly complex models, similarly to the adjusted R-square.

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Process Evaluation

The Cadmus Team followed established, industry-standard methods and TRM protocols to conduct process evaluations in accordance with each program work scope and level of effort required. To determine the evaluation level for each of SWEPCO's seven programs, the Team consulted Protocol C of TRM 5.0, which outlines the conditions under which full a process evaluations *must* be performed. In addition, the TRM states that process evaluations *may* be required for programs that fail to achieve:

- Impact goals within the expected time frame
- Educational or informational objectives
- Participation expectations
- Operational, management, or administrative needs
- Cost-effectiveness of 1.0, measured using the TRC test
- Customer satisfaction expectations
- Intended market effects

TRM 5.0 Process Evaluation Criteria

According to the TRM 5.0, programs that meet the following conditions require a full process evaluation:

- New or modified program or a program component that has not been previously evaluated
- No process evaluation performed during previous funding cycle
- New vendor

The Team then compared each program's 2015 results against the TRM Protocol C to determine which programs met the criteria for a process evaluation. We also reviewed findings from prior years' research and assessed the relative importance of each criterion under Protocol C to determine areas of special focus for the 2015 evaluation.

7. Table 91 shows the results of our Protocol C assessment, which provided the basis for our 2015 process evaluation approach. In addition to listing the criteria that drives the process evaluation level, the table includes 2013-2014 trends for two Protocol C decision points: impact and participation.

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Table 91. TRM 5.0 Protocol C Results

Program	Protocol C Full Process Evaluation Criteria											
	New Component	New Vendor	Impact*,**	2014-2054 Impact Trend	Info/Education	Participation**	2014-2015 Participation Trend	Operational	Cost-Effectiveness	Feedback	Market Effects***	Recommended Process Evaluation Level
CIEEP	●	●	■	↓	●	○	↓	●	●	●	N/A	Condensed
RLP	●	●	●	↑	●	●	↑	●	●	N/A	N/A	Condensed
RSOP	●	●	●	↑	●	●	↓	●	●	●	N/A	Condensed
SBDI	●	●	●	↑	●	●	↑	●	●	●	N/A	Condensed
LMSOP	●	●	■	↑	●	●	↑	●	●	●	N/A	Condensed
Appliance	●	●	■	↓	●	■	↑	●	■	N/A	N/A	N/A+
HPwES	●	●	●	↑	●	■	↑	●	■	●	N/A	Condensed

Key: ● = Does not trigger full process evaluation; ○ = Triggers full process evaluation; ■ = May warrant full process evaluation

* With the exception of LMSOP, for which demand reduction is measured, impact is defined as net energy savings.

** These objectives are described in the TRM 5.0 as whether program performance was "lower or slower than *expected*" (italics ours). That is, the objectives do not map to specific performance goals. Cadmus evaluated year-over-year trends to determine Protocol C applicability, specifically whether the program has achieved reasonable impacts (commensurate with expectations) during each year of its delivery, as well as to compare actual annual performance with goals. With the exception of LMSOP, trends for all programs indicate that program performance aligns with expectations.

*** Because SWEPCO did not define market effects goals for its programs, and because market effects have not been specifically measured in prior years, we determined that this criterion is not applicable to any 2015 programs.

+ SWEPCO does not intend to continue offering the RESAP in 2016; therefore, Cadmus determined that process evaluation activities were not warranted in 2015.

To meet SWEPCO's fiscal objectives, comply with the terms of the TRM, and address the unique needs of each program, the Team identified three levels of process evaluation, only one of which we used in 2015:

1. ***Condensed***. For programs that consistently achieved or exceeded expectations, we conducted a condensed process evaluation, assessing changes in program design, operations, delivery, and marketing, as well as comparing 2015 program performance with savings and participation goals. All of SWEPCO's programs warranted a condensed level of evaluation in 2015. Condensed process evaluation activities included:
   - Following up on 2013 and 2014 recommendations
   - Monitoring program activities and changes

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- Facilitating year-end interviews with key program and implementation staff on topics such as:
  - General program activities, changes, and results
  - Successes and challenges
  - Specific focus areas unique to the program

See Table 92 for the full list of program with a condensed process evaluation.

2. ***Full***. The Team did not conduct any full process evaluations for SWEPCO programs in 2015.
3. ***Hybrid***. In some cases, programs can meet the majority of the Protocol C criteria, but still have a unique area of concern that warrants further research to support SWEPCO's planning for the next energy efficiency program cycle. However, no programs warranted a hybrid process evaluation in 2015.

Based the criteria outlined above, Cadmus conducted six condensed process evaluations. Table 92 describes the Team's analysis tasks for the 2015 evaluation of SWEPCO's program processes.

Table 92. Process Evaluation Tasks

Program	Process Evaluation Level	Participant Surveys	Trade Ally Interviews	Program Staff Interviews Year End	Implementer Interviews - Year End
CIEEP	Condensed	●	○	●	●
RLP	Condensed	○	○	●	●
RSOP	Condensed	○	○	●	●
SBDI	Condensed	○	●	●	●
LMSOP	Condensed	○	○	●	○
Appliance	N/A	○	○	○	○
HPwES	Condensed	○	○	●	●

* Key: ● = Conducted; ○ = Not conducted

The following section describes our general evaluation methodologies. See program sections for specific methodological details.

Participant Surveys

The Team conducted a participant survey for the CIEEP. Although the surveys primarily focused on data collection to support calculation of a new NTG value, we also leveraged participant surveys to gather information on participant satisfaction and other program factors.

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Trade Ally Interviews

The Team conducted trade ally interviews to support the SBDI process evaluation. We designed the data collection instrument to follow up on concerns expressed by some trade allies in the 2014 evaluation regarding the OpenTool software. We prioritized the most active contractors from the census of commercial trade allies. We also used these interviews as an opportunity to examine select trends among SBDI trade allies whom we have surveyed the past two years regarding awareness, satisfaction, and strategies for promoting program measures to customers. See program section for details.

Program and Implementation Staff Interviews

The Cadmus Team interviewed program and implementation staff for every program at end of the evaluation cycle. Our objectives with these end-of-year discussions were to capture high-level observations and findings and collect additional data that supports our full understanding of program changes, activities, and performance during the year. These consisted of one-on-one telephone discussions with the primary program and implementation staff responsible for each program at the end of the evaluation cycle. Interview topics included:

- General program activities, changes, and results;
- Successes and challenges;
- Comprehensiveness;
- Following up on 2014 recommendations; and
- Specific areas of focus that are unique to the program.

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Appendix B: Custom Site Visit Documents

Custom site visit documents are attached for the following projects:

1. SWCI1501, Air Compressor
2. SWCI1509: Demand Control Ventilation
3. SWCI1511: HVAC Controls
4. SWCI1520: Solar PV

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SWCI1501: Air Compressor

Summary

This project involved installing three new 150-HP load/unload air compressors and adding a new cycling refrigerant dryer. These measures improved the overall compressed air system at the manufacturing facility.

The Team evaluated all components of the energy efficiency project. The reported and evaluated energy savings for the site are present in Table 93.

Table 93. Summary of Energy Savings

	Reported Savings Estimate	Evaluated Savings Estimate	Realization Rate
Energy Savings (kWh)	762,372	775,780	102%
Demand Reduction (kW)	93	90	97%

Project Description

The facility retrofitted its compressed air system, which consisted of the following:

- Installing three 150-HP load/unload air compressors
- Installing a cycling refrigerated dryer over a baseline heatless desiccant refrigerated dryer

The energy savings opportunity derived from the compressed air system upgrade are:

4. The use of more efficient air compressors
5. The use of a cycling refrigerated air dryer

Table 94 outlines the baseline and post-retrofit conditions.

Table 94. Summary of Measures and Baseline Assumptions

Measure Name	Base Case or Pre-Retrofit Condition	Measure/Installed Condition
Air Compressor Upgrades	• One 250-HP modulation with blowdown air compressor • One 200-HP load/unload air compressor • One heatless desiccant dryer	• Three 150-HP load/unload compressors • One cycling refrigerated air dryer

Evaluation Methodology

The Cadmus Team determined energy savings for this site based on a review of reported savings information and on-site data collection.

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Project Documentation and Reported Savings Review

The Team obtained and reviewed project documentation to ensure it provided sufficient detail to inform on-site data collection.

On-Site Evaluation Activities

During the site inspection, the Cadmus Team discussed the project in detail with the site contact. The objectives of the site inspection were to:

- Verify that the three new air compressors were installed and operating
- Verify that the new cycling refrigerant dryer was installed and operating

Verified Equipment and Operating Parameters

The Cadmus Team verified all equipment during the site visit. The three new 150-HP compressors were operating as stated. The new cycling refrigerated dryer was installed and operating. Both of the original air compressors were no longer in service. While on the site, Cadmus verified that all the equipment was operating as expected.

Savings Analysis

Cadmus determined annual energy use and peak demand using a daily bin analysis of the pre- and post-retrofit binned meter data provided by the implementer, as shown in Figure 44 and Figure 45.

Figure 44. Baseline Daily Binned Meter Data

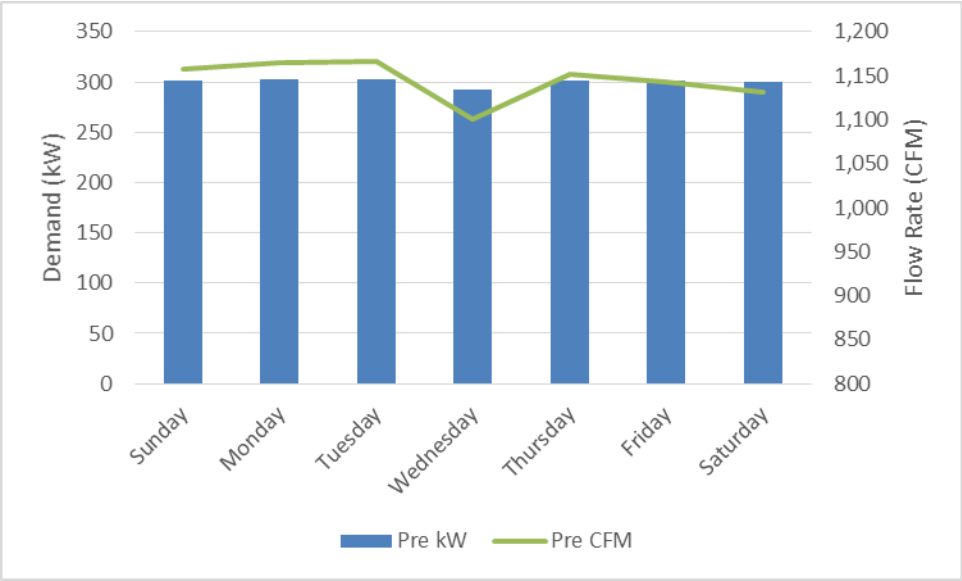

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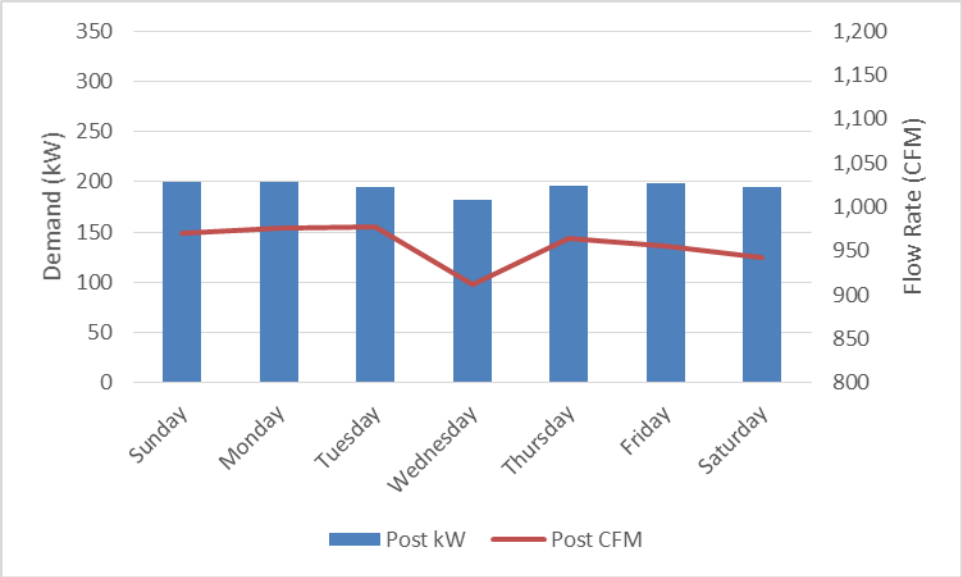
Figure 45. Retrofit Daily Binned Meter Data



The Team also accounted for savings from a flow rate reduction due to adding a cycling refrigerated air dryer.

Project Level Results

Table 95 summarizes the final evaluated savings and realization rates.

Table 95. Project Results

	Reported Savings Estimate	Evaluated Savings Estimate	Realization Rate
Energy Savings (kWh)	762,372	775,780	102%
Demand Reduction (kW)	93	90	97%

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SWCI1509: Demand Control Ventilation

Summary

This project involved installing demand control ventilation (DCV) on a kitchen exhaust hood. The Team evaluated the energy efficiency measure and found that the reported savings for the DCV were reasonable. Table 93 presents the project energy savings.

Table 96. Summary of Energy Savings

	Reported Savings Estimate	Evaluated Savings Estimate	Realization Rate
Energy Savings (kWh)	11,430	11,430	100%
Demand Reduction (kW)	1.2	1.2	100%

Project Description

The newly constructed building invested in DCVs for the kitchen stove top exhaust hood.

Evaluation Methodology

The Cadmus Team determined energy savings for this site based on a review of reported savings information and on-site data collection.

Project Documentation and Reported Savings Review

Cadmus obtained and reviewed project documentation to ensure it provided sufficient detail to inform our on-site data collection. The implementer used a prescriptive spreadsheet calculation to estimate energy savings.

On-Site Evaluation Activities

During the site inspection, the Team discussed the project in detail with the site contact. The objective of the site inspection was to verify that the DCV was installed and operating.

Verified Equipment and Operating Parameters

The Team verified all equipment during our site visit. Figure 46 show the verified equipment.

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Figure 46. DCV Controls and Exhaust hood

Savings Analysis

The Team and the implementer used the same deemed savings methodology for all measures. We determined that the implementer's calculation inputs were reasonable, and therefore the measure achieved the reported energy savings.

Project Level Results

Table 97 summarizes the final evaluated savings and realization rates.

Table 97. Project Results

	Reported Savings Estimate	Evaluated Savings Estimate	Realization Rate
Energy Savings (kWh)	11,430	11,430	100%
Demand Reduction (kW)	1.2	1.2	100%

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SWCI1511: HVAC Controls

Summary

This project involved retrofitting the pneumatic controls on an HVAC system with direct digital controls (DDC). Table 93 presents the energy savings for the site.

Table 98. Summary of Energy Savings

	Reported Savings Estimate	Evaluated Savings Estimate	Realization Rate
Energy Savings (kWh)	473,749	499,528	105%
Demand Reduction (kW)	88	92	104%

Project Description

The facility upgraded its HVAC system controls from a traditional pneumatic system to more efficient, modern DDCs that operate systems automatically using electronic sensors. When used properly, DDC operated systems use less energy than pneumatic controls. Table 94 describes the installed and baseline conditions at the site.

Table 99. Summary of Measure and Baseline Assumptions

Measure Name	Base Case or Pre-Retrofit Condition	Measure/Installed Condition
HVAC Controls Retrofit	HVAC system using pneumatic controls	Installation of DDC controls on HVAC equipment

Evaluation Methodology

The Cadmus Team determined energy savings for this site based on a review of reported savings information, on-site verification, and electric meter data.

Project Documentation and Reported Savings Review

The Team obtained and reviewed project documentation to ensure it provided sufficient detail to inform on-site data collection. The implementer developed spreadsheet calculations for modeled baseline consumption values, then subtracted actual post-installation utility billing consumption from the modeled values to estimate energy savings.

On-Site Evaluation Activities

During the site inspection, Cadmus discussed the project in detail with the site contact. The objective of the site inspection was to verify that the DDCs were installed and operating.

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Verified Equipment and Operating Parameters

The Team verified all equipment during our site visit. The DDCs were operating as stated (shown in Figure 47) and were connected to the building management system (shown in Figure 48).

Figure 47. Newly Installed DDC Panel Connected to Chiller

Figure 48. Building Management System HVAC Control Interface

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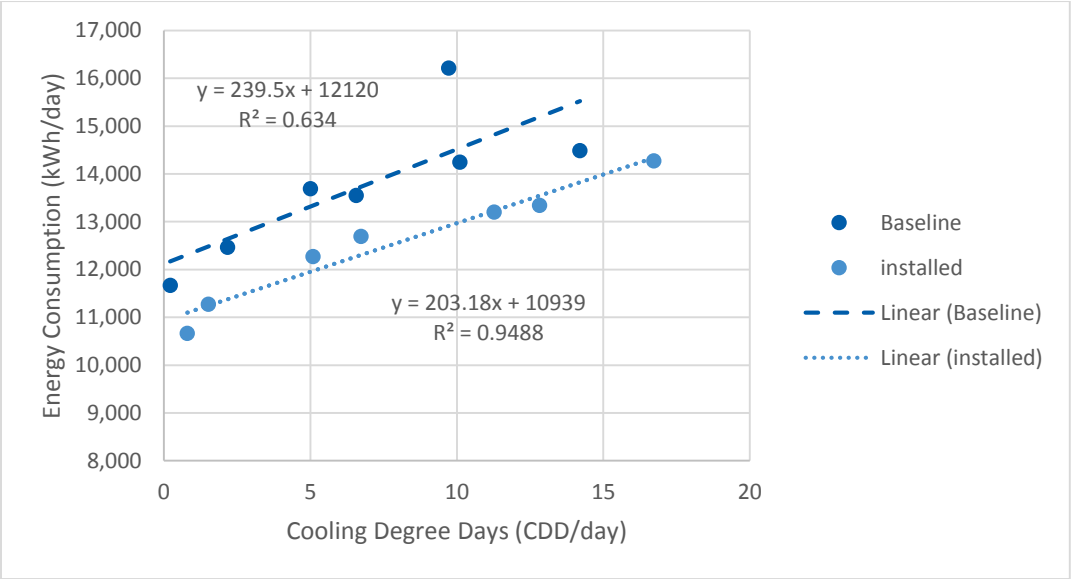
Savings Analysis

The Cadmus Team evaluated savings by developing a correlation between baseline and retrofit energy consumption as a function of ambient temperature and cooling degree days (CDDs). We used 2014 and 2015 electric utility meter data for the baseline and retrofit energy consumption, and the closest weather station temperature data to acquire CDDs. Figure 49 shows the regression of baseline and installed kWh per day versus the CDDs per day. This regression analysis revealed slightly higher energy savings than reported.

Figure 49. Pre- and Post-Retrofit Regression



Project Level Results

Table 100 summarizes the final evaluated savings and realization rates.

Table 100. Project Results

	Reported Savings Estimate	Evaluated Savings Estimate	Realization Rate
Energy Savings (kWh)	473,749	499,528	105%
Demand Reduction (kW)	88	92	104%

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SWCI1520: Solar PV

Summary

This project involved installing a 322.6 kW solar PV array containing 1,265 panels of 255 watts each. The Team received documentation of the array output to compare to the reported energy production. The energy production for the site is shown in Table 93.

Table 101. Summary of Energy Savings

	Reported Savings Estimate	Evaluated Savings Estimate	Realization Rate
Energy Savings (kWh)	383,536	406,279	106%
Demand Reduction (kW)	248	263	106%

Project Description

The facility added a solar PV array on their parking lot and a DC to AC inverter, as shown in Figure 50 through Figure 52, to offset a portion of energy use from the electric distribution grid.

Figure 50. PV Array Close Up

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Figure 51. PV Panel Nameplate

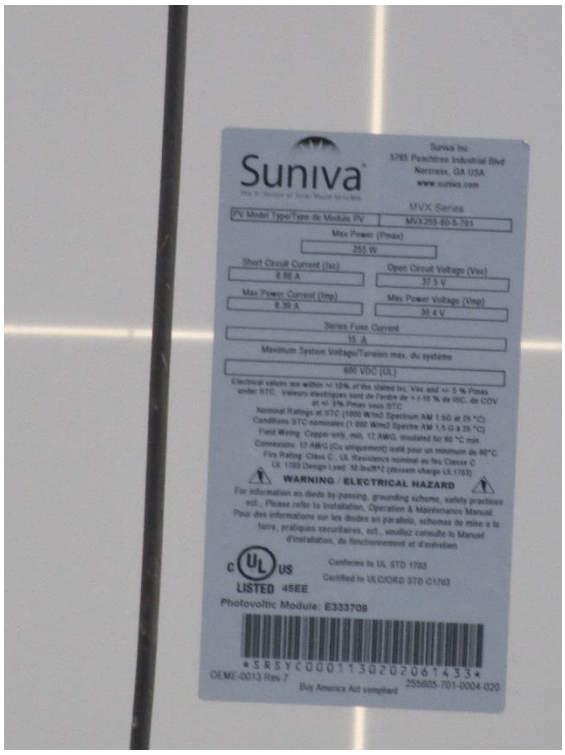

Figure 52. Inverter Nameplate

Evaluation Methodology

The customer gave the inverter meter information to the Cadmus Team, which we used to calculate accurate energy production.

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Project Documentation and Reported Savings Review

The Team obtained and reviewed project documentation to ensure it provided sufficient detail to inform our on-site data collection.

On-Site Evaluation Activities

During the site inspection, the Team discussed the project in detail with the site contact. The objectives of the site inspection were to:

- Verify the installation of the inverter
- Verify the installation of the PV array
- Verify the correct number of PV panels
- Verify the rated output of the PV panels

Verified Equipment and Operating Parameters

The Cadmus Team verified all equipment and information during the site visit.

Savings Analysis

The implementer used PV Watts, an online calculator that estimates generation based on user inputs.**Error! Reference source not found.** Figure 53 and Figure 54**Error! Reference source not found.** show reported savings inputs and outputs from PV Watts calculations.

Figure 53. Reported Savings Methodology

PVWatts — AC Energy & Cost Savings

VA Hospital Fayetteville

Station Identification	
Cell ID:	0226380
State:	Arkansas
Latitude:	36.0 ° N
Longitude:	93.9 ° W
PV System Specifications	
DC Rating:	322.6 kW
DC to AC Derate Factor:	0.770
AC Rating:	248.4 kW
Array Type:	Fixed Tilt
Array Tilt:	5.0 °
Array Azimuth:	212.0 °
Energy Specifications	
Cost of Electricity:	7.0 ¢/kWh

Results			
Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	2.69	19942	1395.94
2	3.33	22646	1585.22
3	4.64	34449	2411.43
4	5.67	39505	2765.35
5	5.99	41904	2933.28
6	6.57	43247	3027.29
7	6.45	42985	3008.95
8	5.91	40001	2800.07
9	4.90	32603	2282.21
10	4.06	28548	1998.36
11	2.84	19713	1379.91
12	2.48	17993	1259.51
Year	4.63	383536	26847.52

Figure 54. Summarized Results from PV Watts

Estimated Production	
A/C kW	A/C kWh
248.4	383,536

The PV installation contractor also installed an interface to provide information on monthly and annual PV generation. This contractor independently estimated that the PV system should generate 427,203 kWh per year. The Team was able to access the actual PV generation meter data, as shown in

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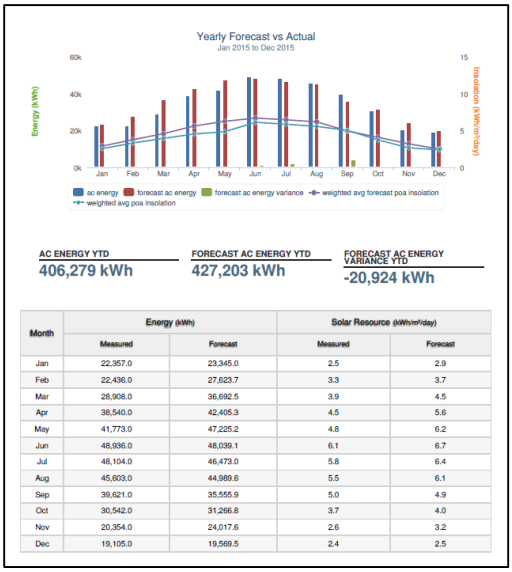
Figure 55. We found that the actual PV generation exceeded the program implementer's estimate, but fell short of the value projected by the PV installation contractor.

Figure 55. Inverter Meter Data



Month	Energy (kWh)		Solar Resource (kWh/m²/day)	
	Measured	Forecast	Measured	Forecast
Jan	22,357.0	23,345.0	2.5	2.9
Feb	22,436.0	27,623.7	3.3	3.7
Mar	28,908.0	36,692.5	3.9	4.5
Apr	38,540.0	42,405.3	4.5	5.6
May	41,773.0	47,225.2	4.8	6.2
Jun	48,936.0	48,039.1	6.1	6.7
Jul	48,104.0	46,473.0	5.8	6.4
Aug	45,603.0	44,989.6	5.5	6.1
Sep	39,621.0	35,555.9	5.0	4.9
Oct	30,542.0	31,266.8	3.7	4.0
Nov	20,354.0	24,017.6	2.6	3.2
Dec	19,105.0	19,569.5	2.4	2.5

Project Level Results

Table 102 summarizes the final evaluated savings and realization rates.

Table 102. Project Results

	Reported Savings Estimate	Evaluated Savings Estimate	Realization Rate
Energy Savings (kWh)	383,536	406,279	106%
Demand Reduction (kW)	248	263	106%

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Appendix C: Program Surveys

The program survey is attached for the following SWEPCO program:

- CIEEP

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SWEPCO
Commercial and Industrial Energy Efficiency Program
Participant Net-to-Gross Survey

November 2015

[RED] = Instructions for programmer

[GREEN] = Instructions for interviewer

Target completes = 35 [may be updated depending on number of email addresses available]

Survey Invitation Email Message

To: [EMAIL ADDRESS]

From: Cadmus on behalf of SWEPCO

Subject: 2015 C&I Energy Efficiency Program

Dear [FIRST NAME]:

SWEPCO is launching a study to understand the experience of customers who participated in the C&I Energy Efficiency Program. We are contacting customers, like you, to learn more about your company's experience participating in the program in 2015. The purpose of the study is to identify any areas in which the program can improve.

We know your time is valuable, and we appreciate you taking time to fill out our short survey. We anticipate that this survey should take approximately 10 minutes.

Follow this link to the survey: [SURVEY LINK]

Or copy and paste this URL into your internet browser: [SURVEY LINK]

In order to receive your gift card and participate in this study, please complete the survey by **November 20, 2015**.

SWEPCO greatly appreciates your participation. If you have any questions about the survey, please feel free to contact me. Thank you in advance.

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Sincerely,

Austin Ditz

Cadmus

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Survey Start Screen/Introduction

[DISPLAY SWEPCO LOGO]

Welcome! SWEPCO is conducting a survey to understand participant experiences with the Commercial and Industrial Energy Efficiency Program (CIEEP). We are reaching out to businesses and organizations that made energy-saving improvements to their facility through CIEEP in 2015. Your feedback today will enable SWEPCO to continue to offer and improve this program. Your responses are very important to us and will be kept confidential. This survey will take approximately 10 minutes to complete.

Your responses are automatically saved and will not be submitted until you complete the survey. This feature will allow you to pause and to change responses before submitting. You can return to the survey at any time by clicking on the survey link provided to you in the email. Please access the survey from the same device each time.

[DISPLAY BEGIN SURVEY BUTTON]

Name: [ ]
Company Name: [ ]
Title: [ ]
I am the: [SELECT ONE] Financial Decision Maker, Technical Decision Maker, Both, Neither

1. Our records show that you made some energy-saving improvements or upgrades to your facility through the SWEPCO CIEEP in the past year. Are you the person in your organization who is most familiar with these improvements or upgrades?
   1. Yes
   2. No
   98. Don't know [THANK AND TERMINATE]

[IF 1 = NO] 1A: Can you please provide the contact information for best person for this survey?

Name [ ]
Email Address [ ]

[AFTER INFORMATION IN 1A IS POPULATED OR IF 1 = DON'T KNOW, DISPLAY: "THANK YOU FOR YOUR TIME AND ASSISTANCE. HAVE A NICE DAY"]

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2. Were the energy-saving improvements that you made all done in the same facility, or in more than one facility?
   1. One
   2. More than one
   98. Don't know

3. Which of the following types of energy-saving improvements were made or items installed in your facility or facilities? Select all that apply [1 = YES, 2 = NO]
   M1. Automatic lighting controls, such as occupancy sensors
   M2. Compressed air
   M3. Exterior lighting
   M4. Faucet aerators and spray valves
   M5. HVAC unit
   M6. HVAC controls
   M7. Industrial pumping
   M8. Industrial process improvements
   M9. Interior Lighting
   M10. PC Power Management
   M11. Refrigeration
   M12. Solar PV
   M13. Variable frequency drives for HVAC motors
   M14. Variable frequency drives for industrial process motors
   M15. Waste water treatment plant fans/pump/blower retrofits
   M16. Other [ ]

4. What is the primary use of your facility or facilities?
   1. Auto repair shop
   2. Gas station
   3. Grocery/food store
   4. Hotel/motel
   5. Manufacturing
   6. Medical—office/clinic
   7. Medical—hospital
   8. Medical- other [RECORD]
   9. Office
   10. Parking garage
   11. Professional services
   12. Religious
   13. Restaurant

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14. Retail/personal services
15. Warehouse
16. Other

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Decision Making and Challenges

5. What factors were important in your decision to make energy-saving improvements through the program? Please record all that apply

6. Does your organization face challenges making energy-saving improvements?
   1. Yes
   2. No

7. [ASK IF Q6 = 1] What kinds of challenges does your organization face when making energy saving improvements? Please record all that apply

Freeridership

Now, we would like to learn more about the energy-saving equipment you installed.

[DISPLAY IF ONLY ONE OR TWO MEASURES MENTIONED IN Q3] The following questions will specifically address the equipment that your organization installed through CIEEP.

[ASK Q0-Q12 TO RESPONDENTS WHO INDICATED INSTALLING ONLY ONE OR TWO MEASURES IN Q3. IF RESPONDENTS INDICATED INSTALLING THREE OR MORE MEASURES, GO TO Q13]

[ASK Q0-Q12 SEPARATELY FOR EACH OF THE MEASURES IN Q3]

8. Before learning about CIEEP, was your organization already planning to purchase and install the [MEASURE NAME] in 2015?
   1. Yes
   2. No
   98. Don't know

9. If the program incentive had not been available, how likely is it that your 2015 budget would have included the full cost of the [MEASURE NAME]?
   1. Very likely
   2. Somewhat likely
   3. Not very likely
   4. Not at all likely
   98. Don't know

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10. If the incentive from the program had not been available, would you still have purchased the exact same **make and model** of [MEASURE NAME], or would you have purchased a different one?
    1. Same
    2. Different
    98. Don't know

11. [ASK IF Q10≠1] Without the incentive, would you have purchased [MEASURE NAME] at all? If so, would it be the same level of efficiency, higher efficiency, or lower efficiency?
    1. Same level of efficiency
    2. Higher efficiency
    3. Lower efficiency
    4. Would not have purchased at all
    98. Don't know

12. Without the incentive, when would you have purchased the [MEASURE NAME]…?
    1. Sooner
    2. At the same time
    3. Later in the same year
    4. In one or two years
    5. In three to five years
    6. After more than five years
    7. Would not have purchased it at all
    98. Don't know

[ASK Q13 to Q22 ONLY IF RESPONDENT RECORDED INSTALLING THREE OR MORE MEASURES IN Q3]

13. Before learning about CIEEP, had funds been set aside in 2015 to purchase and install ALL of the equipment that you installed through the program, SOME of the equipment, or NONE of the equipment?
    1. All of the equipment
    2. Some of the equipment
    3. None of the equipment
    98. Don't know

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14. [IF Q13 = 2] Which of this equipment had your organization set aside funds in 2015 to install before learning about the program? [MULTIPLE RESPONSES ALLOWED; RECORD YES OR NO FOR EACH APPLICABLE RESPONSE]
    1. [DISPLAY IF Q3M1 = 1] Automatic lighting controls, such as occupancy sensors
    2. [DISPLAY IF Q3M2 = 1] Compressed air
    3. [DISPLAY IF Q3M3 = 1] Exterior lighting
    4. [DISPLAY IF Q3M4 = 1] Faucet aerators/spray valves
    5. [DISPLAY IF Q3M5 = 1] HVAC unit
    6. [DISPLAY IF Q3M6 = 1] HVAC controls
    7. [DISPLAY IF Q3M7 = 1] Industrial process
    8. [DISPLAY IF Q3M8 = 1] Industrial pumping
    9. [DISPLAY IF Q3M9 = 1] Interior lighting
    10. [DISPLAY IF Q3M10 = 1] PC Power Management
    11. [DISPLAY IF Q3M11 = 1] Refrigeration
    12. [DISPLAY IF Q3M12 = 1] Solar PV
    13. [DISPLAY IF Q3M13 = 1] VFD HVAC
    14. [DISPLAY IF Q3M14 = 1] VFD industrial
    15. [DISPLAY IF Q3M15 = 1] Waste water treatment plant retrofits
    16. [DISPLAY IF Q3M16 = 1] Other
    98. Don't know

15. If the incentive from the program had not been available, would your 2015 budget have allocated funds for the full cost of ALL of the equipment that you installed through the program, only SOME of the equipment, or NONE of the equipment?
    1. All of the equipment
    2. Some of the equipment
    3. None of the equipment
    98. Don't know

16. [IF Q15 = 2] For which of the equipment types could your 2015 budget have accommodated the full cost? [MULTIPLE RESPONSES ALLOWED; RECORD YES OR NO FOR EACH APPLICABLE RESPONSE]
    1. [DISPLAY IF Q3M1 = 1] Automatic lighting controls, such as occupancy sensors
    2. [DISPLAY IF Q3M2 = 1] Compressed air
    3. [DISPLAY IF Q3M3 = 1] Exterior lighting
    4. [DISPLAY IF Q3M4 = 1] Faucet aerators/spray valves
    5. [DISPLAY IF Q3M5 = 1] HVAC unit
    6. [DISPLAY IF Q3M6 = 1] HVAC controls
    7. [DISPLAY IF Q3M7 = 1] Industrial process
    8. [DISPLAY IF Q3M8 = 1] Industrial pumping

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9. [DISPLAY IF Q3M9 = 1] Interior lighting
10. [DISPLAY IF Q3M10 = 1] PC Power Management
11. [DISPLAY IF Q3M11 = 1] Refrigeration
12. [DISPLAY IF Q3M12 = 1] Solar PV
13. [DISPLAY IF Q3M13 = 1] VFD HVAC
14. [DISPLAY IF Q3M14 = 1] VFD industrial
15. [DISPLAY IF Q3M15 = 1] Waste water treatment plant retrofits
16. [DISPLAY IF Q3M16 = 1] Other
98. Don't know

17. If the incentive from the program had not been available, would you still have purchased the exact same makes and models of ALL of the equipment that you installed through the program, SOME of the equipment, or NONE of the equipment?
    1. All of the equipment
    2. Some of the equipment
    3. None of the equipment
    98. Don't know

18. [IF Q17 = 2] Which of the equipment would you NOT have purchased the exact same makes and models of? [MULTIPLE RESPONSES ALLOWED; RECORD YES OR NO FOR EACH APPLICABLE RESPONSE]
    1. [DISPLAY IF Q3M1 = 1] Automatic lighting controls, such as occupancy sensors
    2. [DISPLAY IF Q3M2 = 1] Compressed air
    3. [DISPLAY IF Q3M3 = 1] Exterior lighting
    4. [DISPLAY IF Q3M4 = 1] Faucet aerators/spray valves
    5. [DISPLAY IF Q3M5 = 1] HVAC unit
    6. [DISPLAY IF Q3M6 = 1] HVAC controls
    7. [DISPLAY IF Q3M7 = 1] Industrial process
    8. [DISPLAY IF Q3M8 = 1] Industrial pumping
    9. [DISPLAY IF Q3M9 = 1] Interior lighting
    10. [DISPLAY IF Q3M10 = 1] PC Power Management
    11. [DISPLAY IF Q3M11 = 1] Refrigeration
    12. [DISPLAY IF Q3M12 = 1] Solar PV
    13. [DISPLAY IF Q3M13 = 1] VFD HVAC
    14. [DISPLAY IF Q3M14 = 1] VFD industrial
    15. [DISPLAY IF Q3M15 = 1] Waste water treatment plant retrofits
    16. [DISPLAY IF Q3M16 = 1] Other
    98. Don't know

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19. [ASK FOR EACH MEASURE MENTIONED IN Q18 OR IF Q17 = 3, ASK FOR EACH MEASURE MENTIONED IN Q3] Without the incentive, would you have purchased a [MEASURE NAME] at all, and if so, would it be the same level of efficiency, higher efficiency, or lower efficiency?
    1. Same level of efficiency
    2. Higher efficiency
    3. Lower efficiency
    4. Would not have purchased at all
    98. Don't know

20. Without the incentive, would there have been a change in the timing of purchase of ANY of the measures that you installed through the program?
    1. Yes, there would have been a change in timing of one or more of the measures
    2. No, there would have been no change in the timing of purchase of ANY of the measures
    98. Don't know

21. [IF Q0 = 1] For which of the measures would there have been a change in the timing of purchase? [MULTIPLE RESPONSES ALLOWED; SELECT ALL THAT APPLY]
    1. [DISPLAY IF Q3M1 = 1] Automatic lighting controls, such as occupancy sensors
    2. [DISPLAY IF Q3M2 = 1] Compressed air
    3. [DISPLAY IF Q3M3 = 1] Exterior lighting
    4. [DISPLAY IF Q3M4 = 1] Faucet aerators/spray valves
    5. [DISPLAY IF Q3M5 = 1] HVAC unit
    6. [DISPLAY IF Q3M6 = 1] HVAC controls
    7. [DISPLAY IF Q3M7 = 1] Industrial process
    8. [DISPLAY IF Q3M8 = 1] Industrial pumping
    9. [DISPLAY IF Q3M9 = 1] Interior lighting
    10. [DISPLAY IF Q3M10 = 1] PC Power Management
    11. [DISPLAY IF Q3M11 = 1] Refrigeration
    12. [DISPLAY IF Q3M12 = 1] Solar PV
    13. [DISPLAY IF Q3M13 = 1] VFD HVAC
    14. [DISPLAY IF Q3M14 = 1] VFD industrial
    15. [DISPLAY IF Q3M15 = 1] Waste water treatment plant retrofits
    16. [DISPLAY IF Q3M16 = 1] Other
    98. Don't know

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22. [ASK FOR EACH MEASURE MENTIONED IN Q21] Without the incentive, when would you have purchased the [MEASURE NAME]?
    1. Sooner
    2. At the same time
    3. Later in the same year
    4. In one or two years
    5. In three to five years
    6. After more than five years
    7. Would not have purchased it at all
    98. Don't know

23. [ASK OF ALL RESPONDENTS] In general, how important was the incentive offered from CIEEP in your decision to purchase the equipment that you installed through the program?
    1. Very important
    2. Somewhat important
    3. Not very important
    4. Not at all important
    98. Don't know

24. Did you receive any financial incentives for any of the measures that you installed through the program besides the CIEEP incentive?
    1. Yes
    2. No
    98. Don't know

25. [ASK if Q24 = 1] What additional source provided incentives?
    1. Arkansas state rebate/incentive
    2. Federal tax credit
    3. Manufacturer rebate
    4. Gas Utility program incentive
    5. Store coupon
    6. Other [please specify] _____
    98. Don't know

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Spillover

Now we have some questions about energy efficiency actions you may have taken since installing the measures that were incentivized by the program.

26. Since participating in CIEEP, have you installed any other energy-efficient products or taken other actions to improve energy efficiency besides what you installed through the program? These could be in any of your facilities.
    1. Yes
    2. No [SKIP TO Q33]
    98. Don't know [SKIP TO Q33]

27.	28.	29.	30.	31.
Please describe the products you installed or actions you took.	How many did you install?	Which of these were included in your initial budget for the project?	Did you receive a rebate, tax credit, or other incentive for any of these products or actions?	What was the source or sources of the incentives?

32. In general, how important was your experience in CIEEP in your decision to install these other measures? Consider, for instance, increased familiarity with efficient products and their performance. Was it…
    1. Very important
    2. Somewhat important
    3. Not very important
    4. Not at all important
    98. Don't know

Customer Satisfaction

Now I would like to know how satisfied you are with aspects of the program.

33. Overall, how satisfied are you with SWEPCO as an electric service provider? Would you say you are very satisfied, somewhat satisfied, not too satisfied, or not at all satisfied?
    1. Very satisfied
    2. Somewhat satisfied
    3. Not too satisfied
    4. Not at all satisfied
    98. Don't know

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34. And how would you rate your overall experience with the program?
    1. Very satisfied
    2. Somewhat satisfied
    3. Not too satisfied
    4. Not at all satisfied
    98. Don't know

35. Is there anything that SWEPCO could have done to improve your experience in the program?
    1. Yes [RECORD _____]
    2. No
    98. Don't know

Demographics

I just have a few more questions about your organization.

36. What is the approximate square footage of the facility or facilities where measures were installed through the program?
    1. [RECORD] _____ [numeric open end up to 1,000,000]
    98. Don't know

37. How many people are employed at these facilities on a daily basis?
    1. [RECORD] _____
    98. Don't know

38. Does your organization lease or own the facilities?
    1. Lease
    2. Own
    98. Don't know

[END OF SURVEY SCRIPT] Your responses have been submitted. Thank you for participating. Have a nice day!

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Appendix D: Survey Frequency Results

The survey frequency results are attached for the following SWEPCO program:

- CIEEP

C&I Energy Efficiency Program: Participant Net-to-Gross Survey Frequencies

...-Title:	Were the energy-saving improvements that you made all done in the same facility, or in more than one facility?	Which of the following types of energy-saving improvements were made or items installed in your facility?
Special Projects	One	Automatic lighting controls, Exterior lighting, Interior Lighting
Director of Engineering	One	VFDs for industrial process motors
Property Manager	More than one	Exterior lighting, Interior Lighting
Director of Special Projects	More than one	Exterior lighting, Interior Lighting
Superintendent	One	Interior Lighting
Maint.Mgr	One	Industrial process improvements, Interior Lighting, VFDs for industrial process motors
EHS Manager	One	Compressed air, Industrial process improvements, PC Power Management, VFDs for industrial process motors
VP Refrigeration and Maintenance	More than one	VFDs for industrial refrigeration, Automatic lighting controls, Exterior lighting, Interior Lighting, Refrigeration
Sr. Sustaniability Analyst	More than one	HVAC unit, Interior Lighting
Business Manager	More than one	Automatic lighting controls, HVAC unit, HVAC Controls, Interior Lighting
General Manager	One	Interior Lighting, Solar PV
District Manager	One	Exterior lighting, Interior Lighting
Plant Manager	One	Industrial process improvements
Sales	One	Interior Lighting
Energy Manager	One	Automatic lighting controls, Interior Lighting, Solar PV

...-Title:	Were the energy-saving improvements that you made all done in the same facility, or in more than one facility?	Which of the following types of energy-saving improvements were made or items installed in your facility?
Maintenance	More than one	Exterior lighting, HVAC unit, Interior Lighting
Safety/Facilities Mgr	More than one	Exterior lighting, HVAC unit, Interior Lighting, PC Power Management
Member	One	Interior Lighting
Global Eng. Manager	More than one	Automatic lighting controls, Compressed air, Exterior lighting, Interior Lighting
Owner	One	Exterior lighting, Interior Lighting
WAREHOUSE MGR.	One	Interior Lighting
Interim Public Works Director	One	Interior Lighting
Refrigeration Manager	More than one	Automatic lighting controls, Exterior lighting, Industrial process improvements, Interior Lighting, Refrigeration
President	One	Exterior lighting, Interior Lighting

What is the primary use of your facility or facilities?	What factors were important in your decision to make energy-saving improvements through the program?
Manufacturing	To save money on electric bills, To save energy, To obtain a rebate/incentive, To replace old/functioning equipment, To acquire the latest technology
Manufacturing	To save money on electric bills, To save energy, To obtain a rebate/incentive, To replace old/functioning equipment, To help protect the environment
Professional services	To save money on electric bills, To save energy, To obtain a rebate/incentive, To replace old/functioning equipment, To acquire the latest technology, To reduce maintenance costs
Manufacturing	To save money on electric bills, To save energy, To obtain a rebate/incentive, To help protect the environment
Other	To save money on electric bills, To save energy, To obtain a rebate/incentive, To replace old/functioning equipment
Other	To save money on electric bills, To save energy, To reduce maintenance costs, To help protect the environment
Manufacturing	To save money on electric bills, To save energy, To obtain a rebate/incentive, To replace old/functioning equipment, To acquire the latest technology, To reduce maintenance costs, To help protect the environment
Warehouse	To save money on electric bills, To save energy, To obtain a rebate/incentive, To replace old/functioning equipment, To acquire the latest technology, To help protect the environment
Retail/personal services	To save money on electric bills, To save energy, To obtain a rebate/incentive, To replace old/functioning equipment, To acquire the latest technology, To reduce maintenance costs
Other	To save money on electric bills, To save energy, To obtain a rebate/incentive, To replace old/functioning equipment, To replace broken equipment, To acquire the latest technology, To reduce maintenance costs, Part of a broader remodeling or renovation
Warehouse	To save money on electric bills, To obtain a rebate/incentive, To obtain a tax credit or other rebate, To help protect the environment
Grocery/food store	To save money on electric bills, To save energy, To obtain a rebate/incentive, To replace old/functioning equipment, Part of a broader remodeling or renovation, To help protect the environment
Manufacturing	To save money on electric bills, To save energy, To obtain a rebate/incentive, To replace old/functioning equipment, To acquire the latest technology
Office	To save money on electric bills, To save energy, To obtain a rebate/incentive, To replace broken equipment, My contractor recommended it
Medical—hospital	To acquire the latest technology, Part of a broader remodeling or renovation, Meet renewable energy mandates

Other	To save money on electric bills, To save energy, To obtain a rebate/incentive, To replace old/functioning equipment, To replace broken equipment, To acquire the latest technology, To reduce maintenance costs
Auto repair shop	To save money on electric bills, To obtain a rebate/incentive, To reduce maintenance costs, To help protect the environment
Other	To save money on electric bills, To obtain a rebate/incentive
Manufacturing	To save money on electric bills, To save energy, To obtain a rebate/incentiveTo reduce maintenance costs, To help protect the environment
Grocery/food store	To save money on electric bills, To save energy, To replace old/functioning equipment, To reduce maintenance costs
Retail/personal services	To save money on electric bills, To save energy, To obtain a rebate/incentive, To reduce maintenance costs, To help protect the environment
Other	To save money on electric bills, To save energy, To obtain a rebate/incentive, To acquire the latest technology, To reduce maintenance costs, To help protect the environment
Warehouse	To save money on electric bills, To save energy, To obtain a tax credit or other rebate, To reduce maintenance costs
Professional services	To save money on electric bills, To obtain a rebate/incentive, To obtain a tax credit or other rebate, To replace old/functioning equipment, To reduce maintenance costs, Part of a broader remodeling or renovation

Does your organization face challenges making energy saving improvements?	What kind of challenges does your organization face when making energy saving improvements?
Yes	High initial cost, Lack of technical knowledge about energy efficiency, Funding competition
Yes	High initial cost, Budget limitations, Lack of staff time
No	
Yes	High initial cost, Long return on investment, long payback period, or investment will not pay back, Funding competition
Yes	High initial cost, Budget limitations
No	
Yes	High initial cost, Budget limitations, Long return on investment, long payback period, or investment will not pay back, Lack of technical knowledge about energy efficiency, Lack of corporate support, Lack of staff time, Funding competition, Do not own building or landlord not interested
Yes	High initial cost, Budget limitations, Long return on investment, long payback period, or investment will not pay back
Yes	High initial cost, Budget limitations, Long return on investment, long payback period, or investment will not pay back
Yes	High initial cost, Budget limitations, Long return on investment, long payback period, or investment will not pay back, Lack of technical knowledge about energy efficiency, Funding competition
Yes	High initial cost
Yes	High initial cost, Budget limitations, Long return on investment, long payback period, or investment will not pay back, Funding competition, Do not own building or landlord not interested
Yes	Lack of staff time
No	
Yes	High initial cost, Budget limitations, Long return on investment, long payback period, or investment will not pay back, Lack of staff time, Funding competition

No	
Yes	High initial cost, Long return on investment, long payback period, or investment will not pay back
Yes	High initial cost, Budget limitations
No	
No	
No	
Yes	High initial cost, Budget limitations, Funding competition
Yes	High initial cost, Budget limitations, Long return on investment, long payback period, or investment will not pay back
Yes	High initial cost, Budget limitations

Before learning about the Commercial and Industrial Energy Efficiency Program, was your organization already planning to purchase and install the [MEASURE NAME] in 2015?	If the program incentive had not been available, how likely is it that your 2015 budget would have included the full cost of the [MEASURE NAME]?
VDF for Industrial Process Motors (No)	VDF for Industrial Process Motors (Not too likely)
Exterior Lighting (Yes), Interior Lighting (Yes)	Exterior Lighting (Somewhat Likely), Interior Lighting (Not too Likely)
Exterior Lighting (No), Interior Lighting (No)	Exterior Lighting (Not at all likely), Interior Lighting (Not at all likely)
	Interior Lighting (Somewhat Likely)
HVAC Unit (Don't Know), Interior Lighting (No)	HVAC Unit (Don't Know), Interior Lighting (Not too Likely)
Interior Lighting (Yes), Solar PV (No)	Interior Lighting (Very Likely), Solar PV (Not too Likely)
Exterior Lighting (Don't Know), Interior Lighting (Don't Know)	Exterior Lighting (Somewhat Likely), Interior Lighting (Somewhat Likely)
Industrial Process Improvements(No)	Industrial Process Improvements(Somewhat Likely)
Interior Lighting(Yes)	Interior Lighting(Not at all Likely)
Interior Lighting (No)	Interior Lighting (Not too likely)
Exterior Lighting(No), Interior Lighting(Don't Know)	Exterior Lighting(Not too likely), Interior Lighting(Not too likely)
Interior Lighting (No)	Interior Lighting (Not too likely)
Interior Lighting (No)	Interior Lighting (Not at all likely)
Exterior Lighting (No)	Exterior Lighting (Don't Know)

If the incentive from the program had not been available, would you still have purchased the exact same make and model of [MEASURE NAME], or would you have purchased a different one?	Without the incentive, would you have purchased [MEASURE NAME] at all? If so, would it be the same level of efficiency, higher efficiency, or lower efficiency?
VDF for Industrial Process Motors (Different)	VDF for Industrial Process Motors (Don't know)
Exterior Lighting (Don't know), Interior Lighting (Don't know)	Exterior Lighting (Same level of efficiency), Interior Lighting (Same level of efficiency)
Exterior Lighting (Don't know), Interior Lighting (Same)	Exterior Lighting (Would not have purchased at all)
Interior Lighting (Same)	
HVAC Unit (Same), Interior Lighting (Same)	
Interior Lighting (Same), Solar PV (Don't know)	Solar PV (Would not have purchased at all)
Exterior Lighting (Different), Interior Lighting (Different)	Exterior Lighting (Lower Efficiency), Interior Lighting (Lower Efficiency)
Industrial Process Improvements (Same)	
Interior Lighting(Different)	Interior Lighting(Lower Efficiency)
Interior Lighting (Don't Know)	Interior Lighting (Would not have purchased at all)
Exterior Lighting(Different), Interior Lighting(Different)	Exterior Lighting(Would not have purchased at all), Interior Lighting(Would not have purchased at all)
Interior Lighting (Same)	
Interior Lighting (Don't Know)	Interior Lighting (Don't Know)
Exterior Lighting (Don't Know)	Exterior Lighting (Don't Know)

Wit12. Without the incentive, when would you have purchased the [MEASURE NAME]…?	Before learning about the CIEEP, had funds been set aside in 2015 to purchase and install ALL of the equipment that you installed through the program, SOME of the equipment, or NONE of the equipment?
	Some of the equipment
VDF for Industrial Process Motors (In one of two years)	
Exterior Lighting (Later in the same year), Interior Lighting (In one or two years)	
Exterior Lighting (After more than five years), Interior Lighting (After more than five years)	
Interior Lighting (At the same time)	
	Some of the equipment
	Some of the equipment
	None of the equipment
HVAC Unit (Don't know), Interior Lighting (In one or two years)	
	All of the equipment
Interior Lighting (Don't know), Solar PV (Would not have purchased at all)	
Exterior Lighting (Don't know), Interior Lighting (Don't know)	
Industrial Process Improvements (At the same time)	
Interior Lighting(At the same time)	
	Don’t know
	All of the equipment
	Some of the equipment
Interior Lighting (Would not have purchased at all)	
	Some of the equipment
Exterior Lighting(Would not have purchased at all), Interior Lighting(Would not have purchased at all)	
Interior Lighting (In one or two years)	
Interior Lighting (Don't Know)	
	All of the equipment
Exterior Lighting (Later in the same year)	

Wit12. Without the incentive, when would you have purchased the [MEASURE NAME]…?	**Before learning about the CIEEP, had funds been set aside in 2015 to purchase and install ALL of the equipment that you installed through the program, SOME of the equipment, or NONE of the equipment?**
Which of this equipment had your organization set aside funds in 2015 to install before learning about the program?	If the incentive from the Program had not been available, would your 2015 budget have allocated funds for the full cost of ALL of the equipment that you installed through the program, only SOME of the equipment, or NONE of the equipment?
Exterior lighting, Interior Lighting	Some
Compressed air, Industrial process improvements, VFDs for industrial process motors	All
Industrial process improvements, VFDs for industrial process motors	Some
	None
	Some
	Don't know
	All
Interior Lighting	Some
Automatic lighting controls, Interior Lighting	Some
	All

For which of the equipment types could your 2015 budget have accommodated the full cost?	If the incentive from the program had not been available, would you still have purchased the exact same makes and models of ALL of the equipment that you installed through the program, SOME of the equipment, or NONE of the equipment?	Which of the equipment would you NOT have purchased the exact same makes and models of?
Don't know	Don't know	
	All	
PC Power Management, VFDs for industrial process motors	Some	Don't know
	None	
HVAC unitInterior Lighting	Some	Automatic lighting controls, HVAC unit, HVAC controls
	All	
	All	
Don't know	None	
Compressed air	All	
	All	

Without the incentive, would you have purchased a [MEASURE NAME] at all, and if so, would it be the same level of efficiency, higher efficiency, or lower efficiency?	Without the incentive, would there have been a change in the timing of purchase of ANY of the measures that you installed through the program?
	Yes—change in timing of one or more measure
	Yes—change in timing of one or more measure
	Yes—change in timing of one or more measure
	Yes—change in timing of one or more measure
Automatic Lighting Controls (Don't Know), HVAC Unit (Lower Efficiency), HVAC Controls (would not have purchased at all)	No—no change in timing for ANY measure
	No—no change in timing for ANY measure
	Yes—change in timing of one or more measure
	Yes—change in timing of one or more measure
	Yes—change in timing of one or more measure
	Yes—change in timing of one or more measure

For which of the measures would there have been a change in the timing of purchase?	Without the incentive, would you have purchased the [MEASURE NAME]?
Automatic lighting controls, Exterior lighting, Interior Lighting	Automatic Lighting Controls (Would not have purchased at all), Exterior Lighting (In one or two years),Interior Lighting (Later in the same year)
Interior Lighting	Interior Lighting (One or two years)
Don't know	
Automatic lighting controls, Exterior lighting, Industrial refrigeration Controls and VFDs	Automatic Lighting Controls (Would not have purchased at all), Exterior Lighting (Would not have purchased at all), Other(Would not have purchased at all)
Interior Lighting	Interior Lighting (In one or two years)
Exterior lighting, Interior Lighting	Exterior Lighting(Later in the same year), Interior Lighting(In one or two years)
Compressed air, Interior Lighting	Compressed Air (In one or two years), Interior Lighting (In one or two years)
Automatic lighting controls, Exterior lighting, Interior Lighting	Automatic Lighting Controls(At the same time), Exterior Lighting(In one or two years), Interior Lighting (In one or two years)

In general, how important was the incentive offered from the CIEEP in your decision to purchase the equipment that you installed through the program?	Did you receive any financial incentives for any of the measures that you installed through the program besides the CIEEP rebate?	What additional source provided incentive(s)?	Since participating in the CIEEP, have you installed any other energy-efficient products or taken other actions to improve energy efficiency besides what you installed through the program?
Very important	No		Don't know
Very important	No		No
Very important	No		Yes
Very important	No		Yes
Somewhat important	No		No
Somewhat important	Don't know		Don't know
	No		No
Very important	No		No
Somewhat important	No		No
Somewhat important	Yes	Arkansas state rebate/incentive	No
Very important	Yes	Federal tax credit	No
Very important	No		Don't know
Somewhat important	No		Yes
Very important	No		No
Not at all important	No		No
Not very important	No		Yes
Very important	No		Yes
Very important	No		No
Very important	No		No
Very important	No		No
Very important	No		Yes
Very important	No		No
Very important	No		No

Please describe the products you installed or actions you took. How many did you install?	Were these included in your initial budget for the project?	Did you receive a rebate, tax credit, or other incentive for any of these products or actions?	What was the source or sources of the incentive(s)?
Interior, exterior (3), sensors	Yes, No, No	Yes, Yes, Yes	Arkansas state rebate/incentive
Interior Lighting, Extrior Lighting	Yes, Yes	No, No	
Used lighting fixtures were installed in a building outside the incentive geographic area, where those fixtures were more efficient than the existing ones. (20)	No	No	Other
Misc. replacement	No	No	
Water Heaters(2), furnace(1), VFD(1)	No, No, Yes	No, Yes, Yes	Utility program incentive
Industrial Refrigeration controls and VFDs	Yes	Yes	Utility program incentive
Oven burner upgrades (3)	No	No	
Led lighting (10)	No	Yes	Utility program incentive
LED Bulbs(10+), LED Fixtures (5+), Water Heater (2)	No, No, No	No, No, No	
lighting controls-other NLR faciltiy(43), compressed air audit(11), pc mngmt- NLR facility(55)	No, No, No	Yes, Yes, Yes	Utility program incentive
Led Lighting(20)	No	No	Utility program incentive
LED BULBS FOR LAMPS(12)	No	No	

In general, how important was your experience in the CIEEP in your decision to install these other measures?	Overall, how satisfied are you with SWEPCO as an electric service provider?	And how would you rate your overall satisfaction with the program?	Is there anything that SWEPCO could have done to improve your experience in the program?	What is the approximate square footage of the facility or facilities where measures were installed through the program?	How many people are employed at these facilities on a daily basis?
Very important	Very satisfied	Very satisfied	Don't know	Don't know	Don't know
	Very satisfied	Very satisfied	No	168000	195
Very important	Very satisfied	Very satisfied	No	5,000 - 25,000	20 to 100
Very important	Very satisfied	Very satisfied	No	130,000	130
Don’t know	Very satisfied	Very satisfied	No	Don't know	145
Somewhat important	Very satisfied	Very satisfied	Don't know	Don't know	Don't know
Somewhat important	Very satisfied	Very satisfied	Online tool to quickly determine payback based on M & V data	130000	185
Very important	Very satisfied	Very satisfied	No	270,000	45
Don’t know	Somewhat satisfied	Somewhat satisfied	No	95,000	Don't know
Very important	Very satisfied	Very satisfied	No	Don't know	500
Don’t know	Very satisfied	Very satisfied	No	Don't know	30
Don’t know	Very satisfied	Very satisfied	No	32,000	30 to 35
Very important	Very satisfied	Very satisfied	No	175,000 sqft	175
Somewhat important	Very satisfied	Very satisfied	No	1200	7
Don’t know	Very satisfied	Very satisfied	No	186000	Don't know
Not very important	Somewhat satisfied	Very satisfied	email follow up and communications	Don't know	75+
Somewhat important	Very satisfied	Very satisfied	Don't know	120000	150
Not at all important	Very satisfied	Very satisfied	No	10000	8
Don’t know	Very satisfied	Very satisfied	No	700,000	600
Very important	Somewhat satisfied	Very satisfied	No	50,000	15
Somewhat important	Very satisfied	Very satisfied	No	32,000	20
Don’t know	Very satisfied	Very satisfied	No	Don't know	Don't know

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Appendix E: Computer Power Management Software Study

Introduction

The Arkansas Technical Reference Manual (TRM) version 3.0, effective January 1, 2014, has approved deemed savings values for installing computer power management (CPM) software. This software produces savings by allowing computers to enter a low-power "sleep" mode when idle. Since these deemed savings became available, this measure has seen high uptake, primarily within the education sector.

During the 2014 and 2015 evaluations, the Cadmus Team investigated the accuracy of savings calculation assumptions for this measure used in the TRM 3.0 (which have remained consistent in TRMs 4.0 and 5.0) by conducting primary research on three separate occasions:

6. In 2014, Cadmus visited eight schools across the state (four each in EAI and SWEPCO territories) that implemented CPM software. This informational study revealed several areas for further research, including deviations in the number of controlled units observed at schools compared to those reported in program tracking data.
7. In May 2015, in part to address comments from the implementer about the prior research, the Cadmus Team visited five participant sites, during which we interviewed on-site IT administrators. We also had further discussions (by phone) with representatives from two additional sites regarding their implementation of CPM software. All participants had installed the software during or after March 2014, within 14 months of the study.
8. The Team conducted a third round of research in January and February of 2016, interviewing five school district IT administrators about their experience with the program. All five participants had installed the software between December 2014 and May 2015 in both EAI and SWEPCO territories.

In the course of this research, the Team made several qualitative observations about trends in equipment installations and operation patterns. Specifically, we observed that on-site IT personnel had low engagement with the software and that several participants anticipated transitioning to new equipment (such as virtual computers or Google Chromebooks) that might limit future savings for CPM measures.

This memo outlines the research methods, consolidated findings, conclusions, and recommendations from these combined research efforts.[37]

[37] Results from 2014 research can be found in the Cadmus 2014 EM&V Final Report. Results from research performed in May 2015 can be found in the "Computer Power Management Software Study" memo dated July 31, 2015.

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Research Methods

The Cadmus Team conducted visual inspections of on-site conditions in 13 schools and had semi-structured in-person and telephone interviews with 20 school district IT administrators between January 2015 and February , 2016. We interviewed all participants within one and half years of installing CPM software. Throughout each of these research efforts, the Team sought to examine equipment operating patterns and to discuss any developments with IT personnel that could limit the persistence of savings. Specifically, we sought to identify:

- IT barriers to implementing CPM software.
- The numbers of desktops, laptops, and other devices actually managed through CPM software compared to reported counts.
- The various ways IT staff uses CPM software to manage energy savings schedules, and how this compares to unmanaged PCs.
- The extent to which schools are shifting away from laptops in favor of Chromebooks.
- The extent to which laptops that are not in use are turned off and charging, making CPM savings redundant.

To estimate the savings realization rate for each hardware category of CPM software, the Team compared the reported number of managed systems with the numbers of managed desktop PCs, notebooks, and monitors provided by interviewed participants.

Summary of Findings from Three Rounds of Research

Number of Managed Systems

Fifteen surveyed participants from the three rounds of research who currently have the CPM software installed gave estimates of the total count and types of computers currently under CPM software control. There were five participants who removed the program entirely from their system. Table 19 shows the number of managed systems reported by each participant compared with the tracking system estimate of managed systems, which varies significantly from 0% at some sites to 226% for desktops and 700% for notebooks.

Table 103. 2015 Comparison of Number of Managed Systems

Research Wave and Participant ID	Vendor	Number of Desktops			Number of Notebooks*		
		Tracking System	Observed	Percentage Observed	Tracking System	Observed	Percentage Observed
3rd Wave, #1	Vendor 1	321	7	2%	323	33	10%
3rd Wave, #2	Vendor 1	695	675	97%	92	225	245%
3rd Wave, #3	Vendor 2	153	345	226%	74	518	700%
3rd Wave, #4**	Vendor 1	155	0	0%	19	0	0%
3rd Wave, #5**	Vendor 1	395	0	0%	392	0	0%
2nd Wave, #1	Vendor 2	700	719	103%	19	28	147%

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Research Wave and Participant ID	Vendor	Number of Desktops			Number of Notebooks*		
		Tracking System	Observed	Percentage Observed	Tracking System	Observed	Percentage Observed
2nd Wave, #2	Vendor 1	385	207	54%	65	89	137%
2nd Wave, #3	Vendor 1	492	427	87%	87	62	71%
2nd Wave, #4	Vendor 2	274	279	102%	12	38	317%
2nd Wave, #5	Vendor 1	344	192	56%	44	24	55%
2nd Wave, #6**	Vendor 1	260	0	0%	10	0	0%
2nd Wave, #7**	Vendor 1	181	0	0%	1	0	0%
1st Wave, #1	Vendor 1	784	N/A	N/A***	-	-	-
1st Wave, #2	Vendor 1	1699	170	10%	-	-	-
1st Wave, #3	Vendor 1	1262	820	65%	-	-	-
1st Wave, #4	Vendor 2	714	700	98%	-	-	-
1st Wave, #5	Vendor 1	329	N/A	N/A***	-	-	-
1st Wave, #6**	Vendor 1	233	0	0%	-	-	-
1st Wave, #7	Vendor 1	1173	282	24%	-	-	-
1st Wave, #8	Vendor 1	1261	353	28%	-	-	-
Total		**11,810**	**5,176**	**48%**	**1,138**	**1,017**	**89%**

*Notebooks were not included in the first wave of research

** These participants reported removing the CPM software from their systems entirely.

***At these two sites, IT staff did not know how to use the dashboard; thus, we have no on-site audit results, and tracker totals are not calculated in Percentage Observed.

Savings Estimates

The Team's first two rounds of research revealed that actual savings for Vendor 1 are much lower than the *ex ante* estimates. We found similar results in the third round of research, with estimated savings from Vendor 1's CPM software being significantly overestimated by the tracker, as shown in Table 104.

Table 104. Estimated Realization Rates by Hardware Category, Third Research Round 2015

Vendor	Desktops	Laptops	Monitors	Total Savings	Participant Count
Vendor 1	44%	31%	47%	44%	4
Vendor 2	226%	700%	226%	267%	1
Total	**60%**	**86%**	**62%**	**63%**	**5**

Table 20 shows that, overall, the program's actual savings have been much lower than reported. Furthermore, while CPM software shows a low overall realization rate, Vendor 2 has a realization rate over 100%.

Table 105. Combined Realization Rates for Three Waves of Research

Vendor	Desktops*	Laptops*	Monitors*	Total Realization Rate	Participant Count (All Three Rounds)

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Vendor 1	50%	85%	49%	36%	14
Vendor 2	119%	556%	119%	116%	4
Total	**65%**	**89%**	**66%**	**49%**	**18**

* The breakdown by hardware category only includes data from the two most recent rounds of research.

Results

The following sections provide qualitative results from Cadmus' interviews conducted in the third round of research, which consisted of two participants who had since deleted the CPM software and three who are still using the software. These findings are largely similar to interview responses obtained during the first two rounds of research, as documented in two previous deliverables.[38] For the actual survey questions, see Appendix A and Appendix B.

Results from Participants Who Deactivated CPM

Both the interviewed participant IT manager and superintendent who chose to install (then uninstall) the CPM software did so under the assumption that it would save the school money on their energy bills by reducing the energy usage of several thousand PCs each night. In our interviews, these participants said their internal PC users began to experience multiple recurring problems with their computers following installation of the CPM software, which they attributed to the software installation. These issues included lost work because of the computers shutting down randomly throughout the day without AutoSaving documents and issues with unwanted pop-ups.

Both participants said they worked to no avail with the software installation company trying to resolve the issues. In one case, the software had been installed for one month, and when problems could not be resolved, the interviewee had to disable the software to enable students to participate in required statewide testing. In the second case, after the software had been installed for two to three months and some teachers were having problems with the AutoSave function, the participant worked with the vendor (who was unable to identify the source of the problem or to find a viable workaround), then ultimately lost confidence in the product and uninstalled it. This participant began removing the energy saving functionality from each computer sequentially as a test, and determined that the issue was related to "something being wrong with the software."

Both participants said that if the issues were resolved, they would likely re-enroll in a similar utility program, although one of these participants stated that they would roll the software out incrementally rather than system wide, and the other participant said they would wait until after statewide testing before implementing CPM software again.

[38] See the EAI and SWEPCO 2014 EM&V Final Reports and "Computer Power Management Software Study" memo dated July 31, 2015.

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Vendor Support

The two participants who deleted the software reported different experiences with vendor support. Both of these participants were using software provided from Vendor 1. One participant said that Vendor 1 was knowledgeable and demonstrated many features of the software. The other participant said Vendor 1 support was inadequate to resolve the problem they experienced, and eventually the vendor stopped responding to their calls. The Cadmus Team experienced similar delays: it took us 38 days and 14 emails to schedule a tutorial with this vendor.

Alternatives

One of these two participants is not currently using any alternative form of PC power management software and would neither recommend nor discourage others from implementing the CPM software through the program. The second participant is using "stock" Windows settings, managed at the server level, which this participant said has the same capabilities as the program software. The only difference is that the software provides reports on energy savings. This participant did not comment on whether they would encourage or discourage others from using CPM.

Software Usability

Although these two participants uninstalled the CPM software, they gave it fairly high satisfaction ratings for usability and ease of completing a task. On a scale from 1 to 10, where 1 is very dissatisfied and 10 is very satisfied, they rated their satisfaction with the usability of the software as 7 and 8, and rated the ease of completing a task as 8 and 9. Neither participant said the software provided additional control over computers and monitors, nor allowed them to complete tasks more quickly. One of the two participants said they did not get to use the software long enough for it to prove its usefulness; however, this participant said the inventory feature would be particularly beneficial.

Suggestions

Both participants offered suggestions to improve the CPM software:

- Provide flexibility for the software to be operated by staff who work on different schedules.
- Resolve the issue of computers shutting down before AutoSaving files.
- Eliminate confusion created by the software having a logo other than the vendor logo. This participant explained that once the CPM software was installed, monitors' would display the McAffe antivirus and security software logo. This created confusion among end users who thought they had mistakenly downloaded a firewall program. Some teachers were hesitant to use the program, and others tried to uninstall the software.

Results from Participants Still Using CPM

Computer Equipment Operation

To assess the degree of operating efficiency improvement provided by the CPM software, Cadmus asked each participant that was using the software about their operating protocols before and after installation of the CPM software.

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Prior to installation, each of the three participants indicated they had either passively managed their computers using Windows default settings or Windows power management programs and using various settings dictated by teachers' schedules and needs. Two participants indicated that the majority of computers were manually turned off over weekends and holiday breaks, while the third said that computers were left on at night to facilitate nightly updates, and no special care was taken to turn desktops or laptops off over breaks.

After the CPM was installed, each participant reported applying different schedules for standby, sleep, and off modes. One participant said they have 4,755 computers total, of which 1,100 are laptops that students take home nightly, and 2,000 are laptops that get placed in carts or labs where they charge overnight in sleep mode.

Customer Familiarity with Report Function

None of the participants said they regularly use the reporting function. Two said they know how to access this function, and one is watching the reports to assess trends of use.

ENERGY STAR® Purchasing Policy

None of the three participants have policies in place to buy only ENERGY STAR-certified computers and monitors; however, Participant 2 said that over 90% of their monitors are ENERGY STAR certified.

Adding Units to the Software

The participants have various amounts of experience adding computers to the CPM software system. Participant 1 relies on the software to automatically add computers and has not manually added any computers. Participant 2 has added approximately 560 computers to the original 300, and is currently managing 860 with the CPM software. Participant 3 has only manually removed computers from the software, and said the software did a good job of adding new computers to the network.

Barriers

Participants encountered four types of barriers to adopting and using the software as described below.

Not Understanding the Program Offer and Operation

Participant 3 was skeptical of the program offer and said that the rollout of CPM software had been complex from the first day. This respondent stated that a quick fact sheet to understand what was being offered and the associated costs would have been very helpful information. They also said it took many calls to reach the right person at the vendor company and to understand who the vendor was—they initially thought the offer was "a scam."

This participant added that once they installed the software, they contacted both their utility and the implementer, CLEAResult, asking for more information about the program. Following this call, the participant was still not sure what vendor would be installing the software, and did not have a clear understanding of the timeline or process associated with the program. Due to the lack of communication, the interviewee stated that their IT managers were uncomfortable providing server access to the software vendors.

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Vendor Support

Participants' experiences with vendor support varied. Participant 1 said they were not provided with any meaningful training after the software was installed. They would like to use the software to implement new policy but were not trained to use the e-policy orchestrator. They have had no interaction with their vendor in the intervening eight months since installation.

However, Participant 2 and Participant 3 reported responsive support from their vendor. Participant 2 initially had issues initiating the software, requiring manual uninstalls and other issues with updating to the newest version. This participant reached out to Vendor 2, who responded within one day and was able to find a resolution.

Equipment Interface

Participant 1 and Participant 3 said the CPM software did not interface well with some of their laptops. Participant 1 said when closed, the laptops would go into sleep mode and not wake up when plugged back into a dock, leading them to disable that setting. Participant 3 said their computer labs had software to monitor student computers, which did not interact well with the power management software. When these computers came back from standby, they would sometimes generate a large amount of network traffic. Participant 3 also found it difficult to exclude some computers that needed to run 24/7 from the software; they chose to simply delete the software from these computers.

Participant 3 also said that their largest barrier was coordinating the various third-party software tools they use to manage their computers: "Bringing in a third-party piece [tool] always has complications and issues. Microsoft tools can manage all the settings that this tool has in place. I could already set a schedule, but to report the benefits it needs to be a third-party tool."

Communication and Behavior within School District

Participant 2 noted that some teachers within their district are not very energy conscious, which makes it more difficult to encourage them to change behaviors, such as turning off computers. Participant 3 has difficulty disseminating information within the school district, such as how staff can access vendor support for help with problems that arise.

Future Outlook

All three participants said that their districts are moving toward Chromebooks. Participant 1 currently has 1,450 Chromebooks and plans to add many more, saying they are much easier to manage. Participant 2, who uses Chromebook for grades 3-12, added 300 of these computers in 2015, and said they will potentially add 200 more in 2016 because Chromebooks provide a better research tool for students, and are more affordable than laptops. This participant is not aware of the ability to manage these computers. Participant 3 stated that the school district is moving toward Chromebooks rather than laptops for elementary school students, but said they will continue to use PCs in middle schools and high schools.

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Suggestions

One of these three participants suggested that the utility roll out these programs during the summer, when schools have time to identify and fix any problems.

Conclusions

Although none of the three rounds of Cadmus' research were robust individually, together they reveal a consistent pattern showing that the program as currently implemented is not delivering the projected results. The following present the Cadmus Team's conclusions based on our research.

- At the majority of sites in the sample, we observed a substantially lower number of managed computers than the number shown in the program tracking data. Overall, Cadmus observed that the number of managed computers ranged from 0% at some sites to 226% for desktops and 700% for notebooks compared to the number reported by vendors. This result corresponds to a 49% realization rate for verified energy savings, as shown in Table 106.

Table 106. Estimated Realization Rates by Utility from Three Rounds of Research

Utility	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate
EAI	3,230,260	1,795,269	56%
SWEPCO	2,334,091	946,766	41%
Total	**5,564,350***	**2,742,035**	**49%**

* Estimated savings do not sum due to rounding.

- Vendor quality plays a significant role in the persistence of savings from CPM software. Cadmus found that only one of the two vendors delivering the program in Arkansas has fewer PCs managed than reported (see Table 19). Furthermore, all rounds of research confirmed a distinct difference in measure persistence between the two vendors. The gap in realization rates between Vendor 1 and Vendor 2, as shown in Table 104 and Table 20, indicates that the quality of vendor software and service can vary dramatically, and has a significant impact on the persistence of CPM measures.
- At five sites, IT staff had either uninstalled or not were not using the CPM software due to implementation challenges, lack of interest, or simply never receiving the measure.
- The ENERGY STAR calculator assumes that monitors are scheduled to enter sleep mode after 15 minutes and computers to enter standby after 30 minutes. This reflects a more aggressive power management schedule than what we observed at the majority of sites reviewed. Many interviewees said they altered sleep mode and standby settings to align with class times, which are typically 50 minutes.
- While the program-qualifying CPM software provided enhanced functionality with a higher potential for savings, at several schools we observed existing software installed that decreased the number of hours computers were idle prior to program participation. This reduces the baseline energy consumption, and therefore savings, for these participants.

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- Student laptops at many PK–12 schools are being phased out in favor of Chromebooks. School districts have made substantial investments to transition students to Chromebooks in the past year and expected to increase the number of Chromebooks over the next several years. Neither program vendors' software is currently compatible with Chromebooks. Therefore, savings associated with CPM software installed on student laptops may not persist for the measure lifetime.
- Student laptops are often housed in carts when not in active use, limiting baseline energy consumption and the resulting available savings.
- Several participants faced challenges in implementing the software, and required vendor support for resolution. Participant experience and satisfaction with vendor support is mixed. Not all participants were trained to effectively interact with the software and several did not understand whether the software was performing as needed. Some vendors appear to be focused on the sale, and do not provide sufficient support after the sale.

Recommendations

Because of the observations listed above, the Cadmus Team cannot conclude that EAI's CitySmart Program or SWEPCO's CIEEP generate the level of savings being reported by vendors. Cadmus offers the following recommendations to help improve program performance and savings resulting from this measure. Given the prevalence of this measure in EAI's CitySmart Program and SWEPCO's CIEEP, these steps will help participants realize the savings claimed.

Implement rigorous monitoring, measurement, and quality control steps to assess vendor performance. This could include:

- Implementing program on-site verification inspection procedures that begin with a 100% inspection rate for the first several installations by each vendor. As the vendors demonstrate their ability to provide high quality, accurate installation services, reduce the inspection rate to a smaller sample percentage. Develop written protocols for handling failed inspections.
- Implementing an online customer feedback survey immediately following installation, and annually thereafter. Use the surveys to gather feedback about vendor performance, number of units being managed, software operations, and behavioral impacts.
- Working with vendors to develop protocols for addressing software issues and providing technical support, including staffing a customer support phone line and implementing performance rules (such as a requirement to address customer concerns within 24 hours).
- Implement a program to recognize and/or reward exceptional vendor service.

Require vendors to provide consistent, standardized training to relevant school district staff following software installation. Work with vendors to develop a training video (online or left with participants) coupled with an on-site training curriculum to provide hands-on support to school district staff following software installation.

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Also have vendors and/or program implementation staff continue to work with participants following initial software implementation to ensure that software installations are completed and span the expected number of devices. Having enhanced and systematic engagement with participants following software implementation will allow for the prompt remediation of errors in applying management controls.

Conduct studies of baseline and post-installation operating patterns to inform assumptions regarding power policies, time spent in sleep mode or turned off, and user behaviors during evenings, weekends, and holidays/vacations. TRM 5.0 assumptions have not been adjusted to reflect typical school schedules; thus, they likely overstate the number of operating hours before and after CPM software installation. Such a study could also be used to determine existing policies or software that may reduce baseline consumption.

Review the continued eligibility of student laptops for this measure. Due to transitions to Chromebooks at PK–12 schools, limited savings are expected to arise from installing CPM software on student laptops, particularly those housed in laptop carts.

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Interview Questions for Participants' IT Managers: Deleted the PC Power Management Software

Reasons for Deletion

9. What made you initially decide to implement the software?
10. When did you stop using PC Power Management software?
    a. When was it installed?
    b. Approximately how many computers were under your PC power management software control?
        i. How many desktop computers?
        ii. How many monitors?
        iii. How many notebooks (laptops)?
        iv. Any other equipment?
11. What were the reasons that the organization is no longer using PC Power Management software?
    a. Was there a precipitating event? (Probe for multiple reasons if only given one)
    b. Did you seek to resolve this issue with the software vendor?
    c. If this issue were resolved, would you be likely to re-enroll in the program?

Vendor Support

12. What support did the vendor provide before the software was implemented? Did you feel they did a good job of walking you through using the software?
13. Did the vendor follow up with you after installation to ensure there were no questions or problems?
    a. How frequent were your interactions with the vendor?

Alternatives

14. Are you using/have you used any other form of PC power management software?
    a. (If yes) What is the name?
    b. (If yes) Do you prefer this software to the one installed through the program? (define the pros and cons)
    c. (If no) Are you planning to implement any other software for PC power management?
15. Would you, or have you, encouraged or discouraged others from implementing the CPM software through the program?

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Savings

16. Did you notice or were you aware of any energy savings from the PC power management software when it was installed?
    a. (if yes) Can you try to quantify that in a dollar amount?

Software Usability

17. Can you speak a bit about your experience with using the software?
    a. On a scale from 1 to 10, where 1 is very dissatisfied and 10 is very satisfied, how satisfied are you with the usability?
    b. On the same scale, how satisfied are you with the ease to complete any given task (such as apply a schedule, create exemptions, etc.)?
        i. Upon completing a task, how confident were you that it was done correctly?
    c. Did this software provide you additional control over computers and monitors?
    d. Did the software enable you to complete tasks more quickly?
18. Is there anything that you would change about the software?
    a. Why?

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Interview Questions for Participants' IT Managers

The Present

19. Approximately how many computers are under your PC power management software control?
    a. How many desktop computers?
    b. How many monitors?
    c. How many notebooks (laptops)?
    d. Any other equipment?
20. What schedules have you applied, and to which of your desktop computers, monitors, and notebooks? In other words, were desktop computers, monitors, and notebooks set to turn off at a certain time, or were they set to sleep after a period of inactivity?
21. Have you exempted any sets of desktop computers, monitors, and notebooks from control? If so, why?
22. Roughly what percentage of the desktop/monitor combinations are provided to administrators, teachers, and students? How are the hours-of-use different?
23. Roughly what percentage of the notebooks are provided to administrators, teachers, and students? How are the hours-of-use different?
24. Do you make it a policy to only buy ENERGY STAR approved computers and monitors? Approximately what percentage of your computers, monitors, and notebooks are ENERGY STAR?
25. Have you had any software issues that may have affected implementation of the controls? Have you at any time needed to contact the vendor to correct a software issue?
26. Do you know how to access the software reports? If so, how often do you do so, and how are these used?
27. After the rebate, has your software automatically added, or have you manually added, more desktop computers, monitors, or notebooks to be under control? How many more?

The Past

28. Before the PC power management software control was implemented, how many desktop computers were already set to go to sleep after a period of inactivity? How many monitors? Did it differ based on the end user? What software was used to enforce this policy or was it activated manually?
29. Before the PC power management software control was implemented, how many desktop computers were manually turned off at night? How many monitors? Did it differ based on the end user? What software was used to enforce this policy or was done manually?
30. Before the PC power management software control was implemented, how many notebooks were already set to go to sleep after a period of inactivity? Did it differ based on the end user? What software was used to enforce this policy or was it activated manually?

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31. Before the PC power management software control was implemented, how many notebooks were manually turned off at night in some way (place in a cart, taken home, or shut off and left in the school)? Did it differ based on the end user? What software was used to enforce this policy or was done manually?
32. Before the PC power management software control was implemented, roughly what percentage of desktops, monitors, and notebooks were shut off during the holidays, winter break, spring break, or summer break? Can you provide a calendar that indicates number of days in session, holidays, weeks off, and summer session?

The Future

33. Has their recently been, or do you anticipate there being, any upgrades to your equipment that might influence computer operation patterns? For example, transitioning from desktop computers to notebook computers, to virtual machines, or to Chromebooks?

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Appendix F: Upstream Lighting Spillover Review and Results

This appendix provides the results of a benchmarking study to determine an appropriate spillover value for use in Entergy's and SWEPCO's upstream lighting programs. Cadmus will incorporate this value into the total net-to-gross (NTG) ratio, used in conjunction with freeridership from the demand elasticity model. The components of the NTG ratio are defined as:

NTG = 1 – Freeridership + Participant Spillover + Non-participant Spillover

Analysis Methodologies

In this study, Cadmus reviewed spillover results from upstream lighting program evaluations in several different utility jurisdictions outside Arkansas. These evaluations used two primary spillover analysis methodologies: surveys and home inventory comparisons. Brief descriptions of both are provided below.

Surveys

A sample of residential customers is selected for a survey. The sample typically consists of program participants or a combination of participants and non-participants from the relevant program jurisdiction. Customers are asked questions to determine if they have purchased bulbs that were not discounted through the lighting program, and if so, whether their decision to purchase non-discounted bulbs was influenced by the program. Program influence may be based on prior customer participation, exposure to program marketing, or other program means that raised customer awareness of efficient bulbs. Customer responses indicating strong program influence on the purchase of non-discounted bulbs are attributed to spillover. The number of spillover bulbs in the sample is extrapolated to the population of program participants, and the percentage of spillover savings relative to overall program savings is determined.

Home Inventory Comparison

Within a jurisdiction, two home inventories are completed over a period of time. The saturation of efficient lighting in the inventoried homes is calculated and compared between the two studies. The difference in efficient lighting saturation between those studies is applied to the population of customers, and an overall increased number of bulbs is calculated. The total quantity of program bulb sales for the time period between the two inventories is summed, and the remainder of bulbs between the increase in saturation and the program bulb sales is attributed to spillover and market effects.

Review Results

Cadmus reviewed of five studies. The utility, reporting year, spillover value, and a brief discussion of the analysis methodology are shown in Table 107. A straight average of the five current values yields a spillover rate of 12.4%.

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Table 107. Upstream Lighting Spillover Values

Utility	Reporting Year	Spillover Value	Analysis Methodology
Progress Energy Carolinas	2012	7%	General population **survey** of residential utility customers, including participants and non-participants; sample size of 605. Survey asked respondents if they purchased full-priced CFLs, were aware of the program, were highly influenced by the program to purchase full-priced bulbs, and number of bulbs purchased (if applicable).
Xcel Energy Minnesota	2012	10%	**Survey** of 410 program participants (who had purchased program discounted bulbs) to determine if they had purchased additional energy-efficient lighting measures (CFLs, LEDs, motion sensors, and/or halogen bulbs) after participating in the program, if they were heavily influenced by the program to do so, and how many units they purchased.
Focus on Energy Wisconsin	2013	20%	135 **home inventory** site visits. CFL bulb saturation in home sockets in which the change in CFL socket saturation for all homes was compared with the expected change in bulb saturation due to program bulb sales alone. The baseline saturation (pre-program implementation) was based on a 2008 self-report phone survey of 345 customers, which gathered information on the number and type of all lights in addition to socket type within their homes.
Ameren Missouri	2015	14%	Spillover value is half of the value used the prior evaluation year (2013) from **home inventories** of 172 homes. The 2013 home inventory determined the saturation of efficient bulbs in Missouri homes.
Public Service Company of New Mexico	2013	11%	Telephone **survey** of 68 program participants, inquiring whether non-incentivized CFLs were purchased, and what motivated the purchase.

Conclusion

Our review of these findings suggests a pattern, with the two highest spillover values deriving from home-inventory research and the lower values from survey research. We expect survey respondents are more likely to under-estimate the effect of the program on their decision-making because people are generally unaware of all factors influencing their behaviors and have a bias toward viewing their effective and virtuous actions as inwardly motivated. The home-inventory approach, on the other hand, may ascribe all additional installations above program sales to the effect of spillover and market effects. It is likely not valid to assume that the program influenced 100% of the efficient bulbs in a given household in a complex marketplace.

After consultation with the IEM, Cadmus will apply the more conservative approach of using only the self-report values to the Arkansas evaluation. The straight average of the three self-report surveys from the table above yields a spillover value of 9.3%.

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Appendix G: Cost-Effectiveness Results by Program

The Cadmus Team analyzed the benefits and costs of each of SWEPCO's energy efficiency programs and of the entire portfolio to determine cost-effectiveness. The Team used Cadmus' DSM Portfolio Pro[39] model, which we also used for SWEPCO's 2012, 2013 and 2014 portfolio cost-effectiveness evaluations. The Team calculated the benefit/cost ratios for the following four perspectives based on methods described in the California Standard Practice Manual for assessing DSM programs' cost-effectiveness:

34. ***Total Resource Cost (TRC) Test:*** From this perspective, the Team examined program benefits and costs from SWEPCO and SWEPCO customers' perspectives, combined. On the benefit side, it included avoided electric and gas (where applicable) energy costs for generation, transmission, distribution capacity, and line losses. On the cost side, it included costs incurred by both the utility (program administrative costs and incentives) and participants (measure costs).
35. ***Program Administrator Cost Test (PAC):*** From this perspective, the Team examined program benefits and costs from SWEPCO's perspective only. On the benefit side, it included avoided electric energy costs for generation, transmission, distribution capacity, and line losses. On the cost side, it included program administration, implementation, and incentive costs associated with program funding.
36. ***Ratepayer Impact Measure (RIM) Test:*** All ratepayers (participants and nonparticipants) may experience rate increases designed to recover lost revenues. For this test, the Team included all SWEPCO program costs, incentives, and lost revenues. The RIM benefits included the same components as the PAC benefits.
37. ***Participant Cost Test (PCT):*** From this perspective, program benefits included participant bill reductions due to the energy saved and incentives received from the program. PCT costs included a measure's incremental cost (compared to the baseline measure) plus installation costs incurred by the customer.

Table 108 summarizes the four tests' components.

[39] DSM Portfolio Pro has been independently reviewed by various utilities, their consultants, and a number of regulatory bodies, including the Iowa Utility Board, the Public Service Commission of New York, the Colorado Public Utilities Commission, and the Nevada Public Utilities Commission.

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Table 108. Benefits and Costs Included in Various Cost-Effectiveness Tests

Benefit/Cost		TRC	PAC	RIM	PCT
Benefits	Present value of electric avoided energy and capacity costs*	◆	◆	◆	
	Present value of gas avoided costs*	◆	◆	◆	
	Present value of bill savings and incentives received				◆
Costs	Program administrative and marketing costs	◆	◆	◆	
	Incremental measure costs incurred by participants	◆			◆
	Incentive costs		◆	◆	
	Present value of utility lost revenues			◆	
	Installation costs				◆

* The present value of electric avoided energy and capacity costs includes avoided line losses occurring from reductions in customer electric use. Present value also includes avoided transmission and distribution benefits.

Tasks involved in this activity are described below.

Data Collection

The Cadmus Team populated DSM Portfolio Pro with avoided energy and capacity costs, discount rates, measure information, administrative costs, and other relevant data. Working with SWEPCO staff, the Team gathered and imported the following data into the cost-effectiveness model:

- Utility level inputs (all provided by SWEPCO)
  - Electric and gas avoided energy costs
  - Electric avoided generation, transmission, and distribution capacity costs
  - Customer retail rates by customer sector
  - Load shapes by customer sector and end use (heating, cooling, lighting, and other)
  - Discount rates
  - Line losses by customer sector
- Program and measure data
  - Program costs (provided by SWEPCO)
  - Evaluated electric energy savings and demand reduction (from this study)
  - Deemed gas savings for air infiltration, ENERGY STAR windows, ceiling insulation, wall insulation, duct improvement (in the RSOP), and clothes washers (in the RESAP)
  - Measure lives (from TRM 5.0 Volume 2) and secondary sources
  - Measure costs (reviewed by the Team and sourced from several secondary sources)
  - NTG ratios (from the 2015 impact evaluation report)
  - Program participation (from SWEPCO's customer database)

Table 109 displays selected cost analysis inputs for the discount rate the Team used for each test to determine the present value of future benefits and lost revenues. The table includes line losses by

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customer sector used to convert participant savings to savings at the generator. SWEPCO provided all of these values, except for the participant discount rate, which Cadmus derived from secondary sources on personal loan interest rates in Arkansas.

Table 109. Selected Cost Analysis Inputs

Input Description	2015
Discount Rate – TRC, PAC, and RIM	6.09%
Discount Rate – PCT	9.99%
Energy Line Loss – All residential programs and SBDI	7.85%
Demand Line Loss – All residential programs and SBDI	8.65%
Energy Line Loss – LMSOP*	5.69%
Demand Line Loss – LMSOP*	6.69%
Energy Line Loss – CIEEP*	6.10%
Demand Line Loss – CIEEP*	6.98%

* LMSOP and CIEEP line losses are consumption weighted averages of SWEPCO's primary and secondary loss adjustment factors.

Table 110 displays SWEPCO's 2015 incentive and non-incentive costs by program.

Table 110. SWEPCO 2015 Program Costs*

Program Name	Non-Incentive Costs	Incentives	Total Program Costs
Apogee Online Audit Tool	$11,224	$0	$11,224
Arkansas Weatherization Program	$9,377	$15,138	$24,515
CIEEP	$1,282,925	$2,486,453	$3,769,378
Energy Education Arkansas	$36,154	$0	$36,154
HPwES Program	$484,412	$627,999	$1,112,410
LMSOP	$54,590	$229,052	$283,642
RLP	$316,845	$293,740	$610,585
RESAP	$245,526	$38,320	$283,846
RSOP	$632,941	$658,063	$1,291,004
Rules/Filings**	$105,251	$0	$105,251
SBDI	$382,234	$741,501	$1,123,735
Portfolio	**$3,561,479**	**$5,090,265**	**$8,651,744**

* Totals may not sum due to rounding.

** Regulatory costs for rules/filings were applied at the portfolio level.

Table 111 shows the lifetime net energy savings and demand reduction at the meter by program.

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Table 111. SWEPCO 2015 Program Lifetime Net Energy Savings and Demand Reduction at Meter*

Program Name	Net Energy Savings (MWh)	Net Demand Reduction (MW)
Apogee	0	0.00
AWP	694	0.39
CIEEP	215,934	41.03
EEA	0	0.00
HPwES	29,853	10.54
LMSOP	127	9.87
RLP	33,823	6.55
ESAP	479	0.08
RSOP	67,715	13.82
Rules/Filings	0	0.00
SBDI	59,791	10.08
Portfolio	**408,416**	**92.37**

* Totals may not sum due to rounding.

The Team analyzed the cost-effectiveness of each 2015 program, as well as of the entire portfolio, from each of the four test perspectives mentioned above. The only exception was for Rules/Filings, which are only costs applied to the portfolio.

Table 112 displays the 2015 portfolio cost-effectiveness results, including the levelized costs of conserved energy; the present value of costs, benefits, and net benefits; and benefit/cost ratios. SWEPCO's 2015 portfolio was cost-effective from all perspectives except the RIM test (a 1.0 or greater benefit/cost ratio is considered cost-effective).

The RIM test measures the impact of a program or portfolio on customer rates. Many programs do not pass the RIM test because a utility's avoided energy savings are usually less than the lost revenues and operating costs of the program. When this happens, program nonparticipants are paying for benefits accrued by the participants through higher rates. The RIM test only passes if rates will go down as a result of the program or portfolio, and this usually only happens in instances in which the program targets the highest marginal cost hours (when marginal costs are greater than rates).

Table 112. SWEPCO 2015 Portfolio Cost-Effectiveness

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource Cost (TRC)	$0.036	$10,914,353	$27,209,526	$16,295,173	2.49
Program Administrator Cost (PAC)	$0.028	$8,651,744	$25,954,944	$17,303,200	3.00
Ratepayer Impact (RIM)	N/A	$34,185,570	$25,954,944	($8,230,625)	0.76
Participant Cost (PCT)	N/A	$7,127,803	$28,553,679	$21,425,877	4.01

Table 113 provides a summary of the 2015 benefit/cost ratios of each program by test perspective. In the table, N/A indicates that the present value of costs from that perspective was less than or equal to

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zero. A benefit/cost ratio of 0.00 indicates that the present value of costs was greater than zero and the present value of benefits was zero.

Table 113. SWEPCO 2015 Benefit/Cost Ratios by Program and Test Perspective

Program Name	Benefit/Cost Ratio			
	TRC	PAC	RIM	PCT
Apogee	0.00	0.00	0.00	N/A
AWP	7.31	2.79	0.89	N/A
CIEEP	2.46	3.33	0.83	3.05
EEA	0.00	0.00	0.00	N/A
HPES	1.26	2.10	0.69	1.72
LMSOP	22.99	5.35	5.19	20.76
RLP	4.37	3.38	0.60	6.92
RESAP	0.12	0.10	0.08	1.84
RSOP	2.60	2.99	0.55	5.63
SBDI	3.13	3.14	0.80	N/A*
Portfolio	**2.49**	**3.00**	**0.76**	**4.01**

* Because this is a direct install program and participant costs are very small compared to benefits, the resulting benefit/cost ratio is not meaningful.

The following tables contain details of the Team's cost-effectiveness analysis results for all programs listed above. Table 114 shows the cost-effectiveness results for Apogee, an online audit tool that does not produce energy savings or demand reduction (Apogee has only costs and no benefits).

Table 114. SWEPCO 2015 Apogee Cost-Effectiveness

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource Cost (TRC)	N/A	$11,224	$0	($11,224)	0.00
Program Administrator Cost (PAC)	N/A	$11,224	$0	($11,224)	0.00
Ratepayer Impact (RIM)	N/A	$11,224	$0	($11,224)	0.00
Participant Cost (PCT)	N/A	$0	$0	$0	N/A

Table 115 shows the cost-effectiveness results for the AWP. The program is cost-effective from the TRC, PAC, and PCT perspectives. The AWP is not cost-effective from the RIM perspective.

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Table 115. SWEPCO 2015 Arkansas Weatherization Program Cost-Effectiveness

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource Cost (TRC)	$0.019	$9,377	$68,504	$59,127	7.31
Program Administrator Cost (PAC)	$0.050	$24,515	$68,504	$43,989	2.79
Ratepayer Impact (RIM)	N/A	$77,048	$68,504	($8,544)	0.89
Participant Cost (PCT)	N/A	$0	$56,069	$56,069	N/A

Table 116 shows the cost-effectiveness results for the CIEEP, which is cost-effective from all perspectives except RIM.

Table 116. SWEPCO 2015 CIEEP Cost-Effectiveness

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource Cost (TRC)	$0.032	$5,087,676	$12,537,362	$7,449,686	2.46
Program Administrator Cost (PAC)	$0.024	$3,769,378	$12,537,362	$8,767,985	3.33
Ratepayer Impact (RIM)	N/A	$15,030,445	$12,537,362	($2,493,083)	0.83
Participant Cost (PCT)	N/A	$3,944,038	$12,018,046	$8,074,008	3.05

Table 117 shows the cost-effectiveness results for Energy Efficiency Arkansas, which does not produce energy savings or demand reduction and has only costs, no benefits.

Table 117. SWEPCO 2015 Energy Efficiency Arkansas Cost-Effectiveness

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource Cost (TRC)	N/A	$36,154	$0	($36,154)	0.00
Program Administrator Cost (PAC)	N/A	$36,154	$0	($36,154)	0.00
Ratepayer Impact (RIM)	N/A	$36,154	$0	($36,154)	0.00
Participant Cost (PCT)	N/A	$0	$0	$0	N/A

Table 118 shows the cost-effectiveness results for the HPwES Program, which is cost-effective from all perspectives except RIM.

Table 118. SWEPCO 2015 HPwES Program Cost-Effectiveness

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource Cost (TRC)	$0.088	$1,877,509	$2,373,963	$496,454	1.26
Program Administrator Cost (PAC)	$0.052	$1,112,410	$2,338,433	$1,226,022	2.10
Ratepayer Impact (RIM)	N/A	$3,391,190	$2,338,433	($1,052,757)	0.69
Participant Cost (PCT)	N/A	$1,432,695	$2,471,059	$1,038,364	1.72

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Table 119 shows the cost-effectiveness results for the LMSOP, which is cost-effective from all four perspectives.

Table 119. SWEPCO 2015 LMSOP Cost-Effectiveness

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource Cost (TRC)	$0.493	$66,043	$1,518,604	$1,452,562	22.99
Program Administrator Cost (PAC)	$2.118	$283,642	$1,518,604	$1,234,962	5.35
Ratepayer Impact (RIM)	N/A	$292,328	$1,518,604	$1,226,277	5.19
Participant Cost (PCT)	N/A	$11,453	$237,737	$226,285	20.76

Table 120 shows the cost-effectiveness results for the RLP, which is cost-effective from all perspectives except RIM.

Table 120. SWEPCO 2015 Residential Lighting Program Cost-Effectiveness

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource Cost (TRC)	$0.021	$624,646	$2,728,866	$2,104,220	4.37
Program Administrator Cost (PAC)	$0.020	$610,585	$2,066,092	$1,455,507	3.38
Ratepayer Impact (RIM)	N/A	$3,433,357	$2,066,092	($1,367,265)	0.60
Participant Cost (PCT)	N/A	$650,772	$4,500,176	$3,849,404	6.92

Table 121 shows the cost-effectiveness results for the RESAP, which is only cost-effective from the PCT perspective.

Table 121. SWEPCO 2015 Residential ENERGY STAR Appliance Program Cost-Effectiveness

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource Cost (TRC)	$0.767	$275,100	$32,826	($242,275)	0.12
Program Administrator Cost (PAC)	$0.791	$283,846	$27,661	($256,186)	0.10
Ratepayer Impact (RIM)	N/A	$329,217	$27,661	($301,557)	0.08
Participant Cost (PCT)	N/A	$56,873	$104,807	$47,934	1.84

Table 122 shows the cost-effectiveness results for the RSOP, which is cost-effective from all perspectives except RIM.

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Table 122. SWEPCO 2015 RSOP Cost-Effectiveness

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Total Resource Cost (TRC)	$0.035	$1,658,473	$4,315,196	$2,656,722	2.60
Program Administrator Cost (PAC)	$0.027	$1,291,004	$3,866,427	$2,575,424	2.99
Ratepayer Impact (RIM)	N/A	$7,088,764	$3,866,427	($3,222,336)	0.55
Participant Cost (PCT)	N/A	$1,030,362	$5,798,936	$4,768,574	5.63

Table 123 shows the cost-effectiveness results for the SBDI Program, which is cost-effective from all perspectives except RIM.

Table 123. SWEPCO 2015 SBDI Program Cost-Effectiveness

Cost-Effectiveness Test	Levelized $/kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource Cost (TRC)	$0.024	$1,162,900	$3,634,205	$2,471,306	3.13
Program Administrator Cost (PAC)	$0.023	$1,123,735	$3,531,861	$2,408,126	3.14
Ratepayer Impact (RIM)	N/A	$4,390,591	$3,531,861	($858,730)	0.80
Participant Cost (PCT) *	N/A	$1,610	$3,366,848	$3,365,238	N/A*

* Because this is a direct install program and participant costs are very small compared to benefits, the resulting benefit/cost ratio is not meaningful.

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5.0 Appendix B

ADM Associates, Inc. – Evaluation of the 2015 Arkansas Weatherization Program Report

Docket No. 07-082-TF

2015 Annual Report

April 29, 2016

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Evaluation of 2015 Arkansas Weatherization Program

Submitted to:

Central Arkansas Development Council
Arkansas Oklahoma Gas Corporation
CenterPoint Energy Arkansas
Oklahoma Gas and Electric
Southwestern Electric Power Company
Empire District Electric Company
Entergy Arkansas, Inc.
Black Hills Energy

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Additionally, we would like to thank participating customers of the aforementioned utilities, the Central Arkansas Development Council (CADC) and participating community action agencies, and Frontier Associates staff for their cooperation and assistance throughout the evaluation.

We would also like to thank Independent Evaluation Monitor staff for their active involvement in providing thorough answers and clarification to the evaluation team when higher-level questions arose during the EM&V effort.

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1. Executive Summary

The purpose of this report is to provide a summary of the methodology and results for the evaluation of the 2015 Arkansas Weatherization Program (AWP). This evaluation was conducted by ADM Associates (referred to in this report as "the Evaluators"). This report provides the results of both the impact evaluation and limited process evaluation activities for 2015, the final year of program operation.

As there have been few significant modifications to overall program structure and delivery since the prior program year, and this is the final year of operation for the AWP, the process findings are mainly focused on assessing program performance characteristics, any changes in program delivery, and the program's responsiveness to prior evaluation recommendations. A comprehensive process evaluation can be found in the 2012 Arkansas Weatherization Program Evaluation Report.

1.1 Summary of Arkansas Weatherization Program

Program design and structure in 2015 remained fairly consistent with the 2014 program year. The following provides a review of program design characteristics and operational procedures, noting any specific updates for 2015.

The primary change for the 2015 program year was that administration of the program, including coordination of implementation activity and allocation of funding to participating agencies, transitioned to the Central Arkansas Development Council (CADC) from the Arkansas Community Action Agencies Association (ACAAA). As CADC had already been closely involved in program implementation and coordination of agencies in prior years, the effects of this transition were fairly minimal.

In 2015, the Arkansas Weatherization Program (AWP) provided residential energy audits and energy efficiency measure installations to homes whose residents are customers of one or more of the following investor owned utilities (IOUs):

- American Electric Power – Southwestern Electric Power Company (AEP-SWEPCO);
- Entergy Arkansas, Inc. (EAI); and
- CenterPoint Energy (CenterPoint).

The following IOUs are sponsoring utilities for the AWP and have achieved savings through the program in past years but did not have any customers participate in the program during 2015:

- Empire District Electric Company (EDEC).
- Oklahoma Gas and Electric (OG&E);

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- Black Hills Energy;[1] and
- Arkansas Oklahoma Gas Corporation (AOG).

The program is offered in conjunction with the Department of Energy (DOE) Weatherization Assistance Program (WAP), which provides federal assistance to fund the customer co-payment in the AWP for income-qualified households. In Arkansas, the WAP is administered by the Arkansas Energy Office (AEO). If the customer meets the eligibility requirements of the WAP, the weatherization project can be funded by both the WAP and the AWP in order to fully cover the project cost and eliminate the cost to the customer.[2] Customers who are not eligible for the WAP are required to provide their own co-pay in order to participate in the AWP and receive the audit and associated measures.

Rather than an income requirement, eligibility for the AWP is based on a set of criteria regarding customer residence energy efficiency. In order to qualify, customer homes must meet specific criteria indicating that the residence is severely energy-inefficient. There were no modifications to these criteria for the 2015 program year.

Local community action agencies work with customers to enroll in the program and determine AWP and WAP eligibility. In 2015, qualifying AWP projects were completed by the following agencies:

- Central Arkansas Development Council (CADC);
- Crowley's Ridge Development Council (CRDC); and
- Pine Bluff Jefferson County Economic Opportunities Commission, Inc. (PBJCEOC).

After the customer is approved and the in-home audit is performed, optimal energy efficiency measures for AWP (and WAP, for eligible customers) are identified through the use of National Energy Audit Tool (NEAT) or Mobile Home Energy Audit (MHEA) software. The measures implemented in participating homes during 2015 include:

- Ceiling, floor and wall insulation;
- Air infiltration reduction;
- Window replacement and storm window installation;
- Heating and air conditioning replacement;

1 Formerly Source Gas Arkansas (SGA).

2 Eligibility for the Weatherization Assistance Program (WAP) is based on income thresholds, which increase with the number of residents in the home. A description of the WAP, along with the associated income requirements, can be found here: http://www.benefits.gov/benefits/benefit-details/1843.

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- Water heater insulation jackets and pipe wrap;
- Refrigerator replacement;
- CFL retrofits; and
- Smart thermostats.[3]

The local agencies conduct onsite audits and install the necessary measures using their internal crews or subcontractors. Audit and installation crews record all relevant measure input data and report it to the Central Arkansas Development Council (CADC), who aggregates the information from each agency. Batches of data are then sent to Frontier Associates, the program database provider that manages the EnerTrek software tool. EnerTrek incorporates the onsite data into TRM savings formulas (and NEAT/MHEA values for measures not included in the TRM) to calculate *ex ante* savings for each measure. The resulting savings are made accessible to program utilities and EM&V contractors, who use EnerTrek database exports to conduct measure implementation and savings verification activities.

Table 1-1 identifies core program stages and includes key activities performed throughout the program process. The activities and stages shown for 2015 are fairly consistent with those of 2014 and prior years, with modifications to include additional details and clarifications regarding program procedures, and to reflect CADC's role as the program administrator.

Table 1-1 Key Activities and Program Stages, 2015 Program Year

Program Stage	*Key Activities*
Program Design Planning	• Utilities set budgets and savings goals for the program year. • Frontier Associates and the participating agencies make any necessary modifications to data collection procedures or program delivery based on TRM changes or other program design changes. • Agencies plan their program activity based on expected WAP funding levels and planned AWP funding.
Training and Implementation Planning	• Community action agencies, contractors, and other program operations staff attend program-relevant training sessions (primarily for new contractor staff) • CADC and local agencies discuss implementation and program updates (primarily to comply with TRM changes).
Program Promotion	• Agencies market the program to local customers who may provide a private co-pay. • Agencies enroll customers from the WAP wait list. • Utilities answer customer inquiries about the AWP or refer customers to their respective agencies.
Program Participation	• Customers apply for the AWP and home eligibility is determined. • WAP eligibility is determined.

[3] A complete list of all eligible program measures can be found in ACAAA Docket no. 07-079-TF, Attachment A (AWP Modified Program Design and Description).

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Program Stage	*Key Activities*
	• Participants receive in-home audits and measures are identified.
	• Contractors install measures that are either stipulated based on NEAT or MHEA software or are agreed upon with the customer (depending on whether or not WAP funds are used for the co-pay).
Data Processing and Monitoring	• Measure costs and participant tracking data are collected by each agency and reported to CADC. • CADC provides periodic cost and participation updates to the utilities. • Frontier Associates receives implementation data from CADC and calculates *ex ante* savings • Frontier Associates sends savings data in batches to the utilities. • Utilities, CADC, and Frontier Associates have periodic discussions regarding program participation levels and other topics.

Starting in 2016, the Arkansas IOUs will be implementing individual and joint weatherization programs that comply with the Consistent Weatherization Approach developed by the Arkansas Parties Working Collaboratively (PWC). The Consistent Weatherization Approach will replace the AWP as the statewide weatherization offering implemented by the Arkansas IOUs, and thus the 2015 program year marks the final year of operation for the AWP.

1.2 Evaluation Objectives

The evaluation of the 2015 Arkansas Weatherization Program (AWP) consisted of a program savings impact analysis and a limited process evaluation. These evaluation objectives were primarily focused on savings analysis and verification, as well as program updates and tracking of prior evaluation findings. Specifically, the evaluation activities conducted for the 2015 program year include:

- Review of deemed savings calculations: The Evaluators used the Arkansas Technical Reference Manual, Version 5.0 (TRM) to verify savings calculations for each implemented measure type in order to ensure that *ex ante* measure savings were properly calculated according to TRM protocols.[4]

- Tracking database and documentation review: The Evaluators conducted a comparative assessment of the AWP tracking database in order to evaluate tracking data modifications and improvements since the 2014 program year.

- On-site field verification: The Evaluators scheduled and conducted site visits to participant homes in order to verify complete and proper measure installation, to conduct post-implementation measurements, and to verify home characteristics such as heating and water heating fuel type.

[4] Although EnerTrek calculated savings for the AWP in 2015 using protocols in TRM 4.0, the Evaluators referenced TRM 5.0 for verification purposes as it was the most current version of the TRM at the time of evaluation.

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- Program staff interviews: Interviews were conducted with program staff. These interviews provided insight into any recent program changes for 2015, updates in specific program processes, and perspectives on closing out the AWP and moving forward with the Consistent Weatherization Approach.

- Participant surveys: Telephone surveys were conducted with a sample of program participants in order to collect data regarding customer satisfaction, participant characteristics, and to identify any issues with program operation or delivery from the customer perspective.

1.3 Summary of Findings

1.3.1 Field Verification Results

The Evaluators conducted onsite verification visits to 13 participant homes. These site visits were conducted in order to verify complete and proper measure installation, to conduct post-implementation measurements, and to verify home characteristics such as heating and water heating fuel type.

Specific notes regarding the onsite and telephone verification findings include:

- **Contact Information:** All residences were located at the addresses provided within the tracking data. Additionally, a high percentage of telephone numbers were found to be accurate, which is an improvement over the 2014 program year. In total, only 4 out of the 54 telephone numbers (7%) dialed by the Evaluators were found to be disconnected or incorrect during the site visit scheduling process.

- **Air Infiltration:** The Evaluators conducted blower door testing in nine participant homes for the 2015 program year. Of these homes, the CFM_{50} value measured during the verification visit was within 10% of the reported value for four homes. The Evaluated CFM_{50} value was more than 10% greater than the Reported CFM50 value for four homes. Overall, the Evaluated CFM_{50} value was greater than the Reported CFM_{50} value for six of the nine homes.

- **Attic Insulation:** All reported instances of attic insulation were verified. There were no significant differences between reported pre-installation R values and evaluated pre-installation R values. There were no significant differences between reported square footage and evaluated square footage.

- **Water Heater Jacket and Pipe Wrap:** The Evaluators were able to verify all but one instance of water heater jackets. In this case, the Evaluators found that silver bubble wrap had been used to wrap the water heater, rather than standard insulation jackets. The agency responsible for this work reported that the silver bubble wrap is no longer being used. All reported instances of water heater pipe wrap were verified, but in at least two cases the pipe wrap was installed on the

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pressure release valve line. The agency responsible for this work reported that the water heater pipe wrap had been installed on the proper lines during the initial inspection of the home.

- **Central Air Conditioner Replacement:** All but one reported instance of central air conditioning replacement were verified. One customer did not appear to have had a new unit installed, and their existing unit was not functioning at the time of the site visit.
- **CFLs:** All reported instances of CFL installation were verified, in quantities that matched or closely matched program tracking data. All verified CFLs matched the wattage and lumen range reported in the EnerTrek tracking data.
- **Gas Heat Replacement:** All reported instances of gas heat replacement were verified.
- **Window Replacement:** All reported instances of window replacement were verified.
- **Smart Thermostat:** All reported instances of smart thermostat installation were verified.
- **Refrigerator Replacement:** All reported instances of refrigerator replacement were verified.
- **Window Air Conditioner:** All reported instances of window air conditioners were verified.
- **Wall Insulation:** All reported instances of wall insulation were verified.
- **Direct Vent Heater:** All reported instances of direct vent heater installation were verified.

The results of the verification activity suggest that measures are for the most part installed in the quantities reported in program tracking data. However, the Evaluators found that the quality of work conducted in the two sampled homes serviced by PBJCEOC was fairly poor. This includes the instances of silver bubble wrap and pipe insulation on pressure relief valves mentioned above. Overall, issues identified within these homes include:

- It appeared that silver bubble wrap was used as water heater insulation, rather than standard insulation jackets;
- Plenum sealing was done with tape that did not effectively stick to surfaces;
- Caulk was used in gaps that were too large, where foam sealing should have been used;
- Water heater pipe insulation was added to the pressure release line; and
- One customer indicated that the contractor had damaged paint/trim in the home.

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These findings were submitted to CADC and PBJCEOC staff responded, indicating that the silver water heater wrap is no longer being used and that the water heater pipe insulation had been added to the proper lines when the home was inspected. However it may be beneficial to conduct further training with PBJCEOC staff in order to ensure that they are complying with industry quality standards, and that they are providing adequate customer service to participants.

1.3.2 Summary of Ex Post Net Savings

For measures implemented through the 2015 program, savings verification was performed according to methodologies described in TRM V5.0. The following table identifies the sections in the TRM that were used for verification of measure-level savings under the AWP:[5]

Table 1-2 TRM Sections by Measure Type

Measure	*TRM Version*	*Section in TRM*
Air Infiltration	5.0	2.2.9
Ceiling Insulation	5.0	2.2.2
Central AC Replacement	5.0	2.1.6
ENERGY STAR® Windows	5.0	2.2.7
Floor Insulation	5.0	2.2.4
Gas Furnace Replacement	5.0	2.1.3
Heat Pump Replacement	5.0	2.1.8
Lighting Efficiency	5.0	2.5.1
ENERGY STAR® Refrigerator	5.0	2.4.3
Smart Thermostat	5.0	2.1.12
Storm Windows	5.0	Appendix H
Direct Vent Heaters	5.0	2.1.1
Wall Insulation	5.0	2.2.3
Water Heater Jackets	5.0	2.3.2
Water Heater Pipe Insulation	5.0	2.3.3
Window AC	5.0	2.1.10

Table 1-3 and Table 1-4 present *ex post* net savings for electric utilities and gas utilities, respectively. Table 1-5 presents the *ex post* net savings by measure, including measure-level realization rates (RR). The net-to-gross ratio for the AWP is 1, meaning that net savings are equal to gross savings.

[5] The savings for storm windows were calculated through NEAT/MHEA, and these measures do not have an associated savings algorithm section in the TRM. However, Appendix H in TRM V5.0 specifies that NEAT/MHEA peak savings for storm windows should be multiplied by a deemed demand factor. This approach was used for the 2015 evaluation.

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Table 1-3 Ex Post Net Savings by Electric Utility

Electric Utility	*# of Homes*	*Peak Demand Savings (kW)*	*Annual Savings (kWh)*	*Lifetime Savings (kWh)*
AEP-SWEPCO	13	23.12	43,922.09	693,639.06
EAI	68	69.30	155,489.33	2,146,105.97
OG&E	0	-	-	-
Non-IOU	13	18.37	24,152.96	338,719.81
Total	94	110.78	223,564.39	3,178,464.84

Table 1-4 Ex Post Net Savings by Gas Utility

Gas Utility	*# of Homes*	*Peak Demand Savings (Therms)*	*Annual Savings (Therms)*	*Lifetime Savings (Therms)*
AOG	0	-	-	-
CenterPoint	76	554.85	21,461.16	283,903.33
Black Hills	0	-	-	-
Non-IOU	18	38.82	1,606.89	23,579.04
Total	94	593.67	23,068.05	307,482.37

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Table 1-5 Ex Post Net Savings by Measure Type – Overall

Measure	*Peak Demand Savings (kW)*	*Annual Savings (kWh)*	*Lifetime Savings (kWh)*	*Peak Demand Savings (Therms)*	*Annual Savings (Therms)*	*Lifetime Savings (Therms)*
Air Infiltration	42.63	93,953.88	1,033,492.63	470.42	15,608.29	171,691.19
Ceiling Insulation	44.86	66,225.09	1,324,501.86	78.29	4,548.53	90,970.65
Central AC Replacement	4.19	4,351.15	82,671.92	-	-	-
Direct Vent Heater	-	-	-	17.73	1,161.06	14,678.90
Duct Sealing Installation	-	-	-	-	-	-
Floor Insulation	0.04	676.16	13,523.24	(0.09)	8.73	174.56
Gas Central Replacement	-	-	-	9.36	603.44	11,321.70
Heat Pump Replacement	0.55	2,875.80	46,012.78	-	-	-
Refrigerator Replacement	0.64	4,368.84	56,566.98	-	-	-
Residential Lighting	3.97	27,054.29	213,511.46	-	(0.31)	(2.35)
Smart Thermostat	-	7,043.15	77,474.61	-	397.11	4,368.21
Storm Windows	0.01	28.30	566.00	0.90	29.20	584.00
Wall Insulation	0.54	521.73	10,434.56	-	194.52	3,890.50
Water Heater Insulation	-	-	-	0.03	18.64	242.32
Water Heater Pipe Insulation	0.02	394.75	4,342.25	0.12	59.12	768.58
Window AC	0.77	637.73	6,696.16	-	-	-
Window Replacement	12.55	15,433.52	308,670.38	16.92	439.71	8,794.12
Total	110.78	223,564.39	3,178,464.84	593.67	23,068.05	307,482.37

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Table 1-6 presents annual therms and kWh realization rates by measure category. These realization rates are presented at the program level, and individual utility realization rates may vary from those presented in this table.

Table 1-6 Gas and Electric Realization Rates by Measure Type

Measure	*kWh Realization Rate*	*kW Realization Rate*	*Therms Realization Rate*	*Peak Therms Realization Rate*
Air Infiltration	100%	100%	100%	100%
Ceiling Insulation	101%	149%	102%	101%
Central AC Replacement	71%	161%	-	-
Direct Vent Heater	-	-	162%	162%
Duct Sealing Installation	-	-	-	-
Floor Insulation	75%	68%	100%	-
Gas Central Replacement	-	-	107%	108%
Heat Pump Replacement	49%	52%	-	-
Refrigerator Replacement	178%	178%	-	-
Residential Lighting	110%	118%	230%	-
Smart Thermostat	1909%	-	129%	-
Storm Windows	100%	125%	100%	146%
Wall Insulation	104%	131%	107%	0%
Water Heater Insulation	0%	0%	100%	100%
Water Heater Pipe Insulation	96%	98%	100%	102%
Window AC	148%	100%	-	-
Window Replacement	100%	100%	100%	100%
Overall	103%	118%	103%	101%

1.3.3 Summary of Savings Verification Findings

Ex post savings were calculated through TRM verification of EnerTrek inputs and *ex ante* savings values. Any instances of discrepancies between *ex ante* and *ex post* savings were due to one of three issues:

- Difference in TRM: EnerTrek calculated measure savings in 2015 using TRM 4.0, and the Evaluators conducted savings verification using TRM 5.0. There were differences in input assumptions, measure parameters, and savings equations between the two TRM versions for some measures.
- Calculation Error: Any difference in interpretation of TRM protocols, mathematical errors, or data entry errors may cause *ex ante* savings to be higher or lower than *ex post* (verified) savings.
- On-site Verification Issues: Measures that were unable to be verified during verification visits at participant's homes received zero savings.

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The realization rate for most measures was close to 100%, and the Evaluators found that the majority of discrepancies between *ex ante* and *ex post* savings were due to differences between TRM V4.0 and TRM V5.0 rather than due to calculation errors.

The following list identifies measure categories where there were significant differences between *ex ante* and *ex post* savings, and specifies whether this was due to differences in TRM versions or due to calculation errors:

- Ceiling Insulation
  - Difference in TRM: High overall electric and gas realization rates were due to differences in TRM versions. TRM V5.0 provides deemed saving tables for both R-38 and R-49 and allows for linear interpolation for insulation that is between the two R-values. TRM V4.0 only provides a deemed savings table for R-38 insulation.
- Floor Insulation
  - Calculation Error: Low overall electric realization rates are due to differences in TRM versions. Deemed savings in TRM V5.0 included negative energy savings values depending on weather zone and HVAC equipment configuration. The simulation procedures used for this measure in TRM V5.0 identified negative electric savings, likely caused by the floor insulation acting as a barrier to ground cooling effects. This would cause the home temperature to be higher during cooling months, likely resulting in increased air conditioner usage. The *ex ante* savings calculation did not allow for homes to receive negative energy savings for floor insulation while realized savings incorporated this increased energy usage.
- Wall Insulation
  - Difference in TRM: High overall electric and gas realization rates were due to differences in TRM versions. TRM V5.0 provides deemed saving tables for both R-13 and R-23 and allows for linear interpolation for insulation that is between the two R-values. TRM V4.0 only provides a deemed savings table for R-13 insulation.
- Residential Lighting
  - Difference in TRM/Calculation Error: High overall electric and gas realization rates were due to differences between TRM versions and possible EnerTrek calculation issues. CFL annual kWh savings in EnerTrek may have been calculated as an increment of lifetime savings, which takes into account future baseline changes that should not affect first-year kWh savings. Additionally, the interactive effects factor to account for gas heating penalties was updated in TRM V5.0.
- Refrigerator Replacement

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  - Difference in TRM/Calculation Error: High overall electric realization rates were due to differences between TRM versions and possible EnerTrek calculation issues. Refrigerator annual kWh savings in EnerTrek may have been calculated as an increment of lifetime savings, which takes into account future baseline changes that should not affect first-year kWh savings. ADM also assigned TRM V5.0 refrigerator types based on the model number of the efficient refrigerator provided in the tracking data.

- Central AC Replacement
  - Difference in TRM: The low kWh realization rate and high kW realization rate is due to differences in TRM versions. TRM V4.0 provides a deemed savings table while TRM V5.0 provides a savings algorithm requiring additional measure specific inputs.
- Direct Vent Heater
  - Calculation Error: High overall electric realization rates were due to differences between TRM versions and possible EnerTrek calculation issues. Direct vent heater annual kWh savings in EnerTrek may have been calculated as an increment of lifetime savings, which takes into account future baseline changes that should not affect first-year kWh savings. In addition, in cases where existing unit exceeded the age of eligibility that can be claimed as early retirement according to Section 1.8 of TRM V5.0, replacement on burnout methodology was used.
- Gas Central Replacement
  - Difference in TRM/Calculation Error: High overall gas realization rates were due to differences in TRM versions and possible EnerTrek calculation issues. Gas Central Replacement annual kWh savings in EnerTrek may have been calculated as an increment of lifetime savings, which takes into account future baseline changes that should not affect first-year kWh savings. In addition, in cases where existing unit exceeded the age of eligibility that can be claimed as early retirement according to section 1.8 of TRM V5.0, replacement on burnout methodology was used. Finally, heating load value and equivalent full hours were updated in TRM V5.0.
- Heat Pump Replacement
  - Difference in TRM/Calculation Error: The low electric realization rates are due to differences in TRM versions. TRM V4.0 provides a deemed savings table while TRM V5.0 provides a savings algorithm requiring additional measure specific inputs.
- Smart Thermostat

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  - Difference in TRM: The high electric and gas realization rates are due to differences in TRM versions. Smart Thermostats were added for TRM V5.0. Previous evaluations relied on NEAT savings values.

- Storm Windows
  - Difference in TRM: The high peak savings realization rates are due to differences in TRM versions. TRM V5.0 provides updated multipliers used estimating peak demand reductions.
- Water Heater Pipe Insulation
  - Difference in TRM/On-site Verification Issues: The low electric realization rates are due to an adjustment made by the Evaluators based on on-site verification of this measure. This is described in more detail in Section 2.6. The high peak gas realization rates are due to updates to TRM V5.0.
- Water Heater Tank Wrap
  - On-site Verification Issues: The 0% electric realization rate is due to an adjustment made by the Evaluators based on on-site verification of this measure. This is described in more detail in Section 2.6.
- Window AC
  - Difference in TRM: The high overall electric realization rates are due to differences in TRM versions. The room adjustment factor was updated for TRM V5.0 causing an increase in savings.

Detailed savings verification findings can be found in Sections 2.8 and 2.9 of this report.

1.3.4 Responsiveness to Prior Year Recommendations

Table 1-7 summarizes the status of issues and recommendations identified in the 2014 process evaluation and impact evaluation of the Arkansas Weatherization Program. Some issues such as tracking data errors have been addressed, but several of the issues have persisted through the 2015 program year.

Table 1-7 Status of Recommendations from 2014 Program Year

Issue	***Consequences***	***Recommendation***	***Program Response***	***Status of Issue***
Many AWP operational and performance issues are related to WAP operations and WAP requirements for community action agencies.	Restricts agency participation in AWP May create inconsistencies in data collection, leading to potential errors for the AWP	CADC should continue to make efforts to work with the AEO in developing a mutually beneficial working relationship, and maintain consistency between the two programs where feasible.	There does not appear to have been an improvement in agency activity or improved cooperation between WAP and AWP mechanisms.	Persists
There were minor tracking data errors such as missing *ex ante* savings, calculation errors, and other missing fields in some cases.	Potentially lost savings Skewed measure-level realization rates	Resolve these tracking data issues for the 2015 program year.	Most tracking issues have been resolved, only minor issues remain	Resolved
Some utilities provide or link to program documents that are out-of-date. Most of the participating agencies do not discuss the AWP on their websites, and frame weatherization as an income-qualified service.	Customers may gain inaccurate information regarding service providers and other details. May reduce program interest from private co-pay customers.	The utilities should review their website materials and provide links to updated program documentation if possible. The agencies should provide information regarding the AWP on their websites, and explain that the program does not have an income level requirement.	No longer relevant for most utilities, and AWP marketing has ceased due to program ending after 2015.	Reviewed and Rejected/No Longer Applicable
Some data are not available due to being only in hardcopy form or decentralized from the CADC.	Potential lost data Potential delays in data transfer if additional data are needed	Agencies should maintain electronic records of all collected audit, implementation, and verification data.	Sufficient electronic data exist to satisfy TRM requirements, but some data remain in hard copy only	Partially Addressed

Issue	Consequences	Recommendation	Program Response	Status of Issue
Periodic program activity updates to the utilities do not include measure level cost data or measure counts.	Limits utility ability to plan for annual reporting Limits utility awareness of program performance	Include more details in the periodic reports that are sent to utilities, including measure counts/descriptions, customer names, etc.	The level of detail in monthly and quarterly reports to the utilities from CADC and other agencies has not increased. Measure counts and specific participant information have not been included.	Persists
The reported air infiltration leakage rates appear skewed downward, based on the Evaluators' site visits.	Possible issues with measure implementation or data collection Possible discrepancies between implementation and verification that will lead to skewed realization rates.	1: Include itemized air infiltration measures in the tracking data so that the Evaluators are able to verify individual measure elements 2: Include any field notes related to the blower door test in the tracking data so that the Evaluators may more accurately recreate the testing conditions 3: Discuss air infiltration testing procedures with the Evaluators in order to ensure that the testing methodologies are consistent among agencies, their contractors, and the Evaluators.	There has been no change in the level of detail of air infiltration measures, and no clarification of methodologies	Persists

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1.3.5 Summary of Conclusions and Recommendations

After reviewing the Arkansas Weatherization Program for 2015, the Evaluators highlight the following conclusions:

Minimal Effects from CADC Transition: The transition from ACAAA to CADC as the program administrator does not appear to have mitigated the AWP's operational or performance issues. It appears that CADC made efforts to work with the AEO and increase agency involvement with the program, but any beneficial effects of these efforts were for the most part overshadowed by the program's decreased activity overall.

Quality of Work Issues: The Evaluators visited two participating homes that received weatherization services from PBJCEOC during 2015. The Evaluators identified issues with the quality of work performed, and one of the homeowners indicated that the agency contractors had chipped paint in their home and had not been considerate of the home in general. The Evaluators found that silver bubble wrap had been used as water heater tank insulation in one home and that water heater pipe wrap was not correctly in place at the time of the visit. It is unclear whether these quality of work issues are limited to this agency or are indicative of a larger problem, and agency staff responded to the findings indicating that the silver bubble wrap is no longer being used and that the pipe wrap had been installed properly. However it may be beneficial to conduct further training with agency staff in order to ensure that they are complying with industry quality standards, and that they are providing adequate customer service to participants.

Minor Improvements in Data Accuracy: Tracking data errors have been for the most part resolved in 2015, and the current version of the tracking database within EnerTrek contains the necessary information to comply with TRM V4.0 requirements. Overall Frontier Associates has been very responsive to data requests and provided the utilities with fairly accurate batches of data throughout the program year. There were fewer tracking data issues in 2015 as compared to 2014.

Continued WAP Reliance Issues: As with prior years, program staff acknowledged the challenges that have emerged and persisted due to the AWP's relationship with the Weatherization Assistance Program (WAP). Ideally, this arrangement would use utility funds to efficiently leverage federal funding and substantially increase the number of weatherization projects that the agencies are able to perform. However, the AWP's inherent link to the WAP has continued to result in performance issues due to federal funding reductions. Additionally, the participating agencies were directed to prioritize LIHEAP funding over AWP funding when implementing weatherization projects, which is a key barrier to AWP program activity.

Decreasing Program Activity: The number of participants and the resulting savings levels for the AWP have steadily decreased since the 2011 program year. A major contributing factor to this decline in program activity is likely the fact that the program was winding down in 2015 and the IOUs were already focusing efforts on the Consistent Weatherization Approach. However other issues including variable agency engagement

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in weatherization services, inconsistent availability of WAP funding, and insufficient interest from private co-pay customers have historically limited the program's performance.

Upcoming Consistent Weatherization Approach: The new weatherization framework developed by the utilities and other stakeholders has established statewide weatherization procedures and services, and will be implemented beginning in 2016. Utility staff reported that they anticipate that this Consistent Weatherization Approach will be a more effective method of meeting the state's weatherization needs. Additionally, utility staff noted that the collaborative relationship among utilities has improved during the development of the new framework and that the core framework will hopefully lead to a more coordinated approach to weatherization in the state.

Although 2015 marks the final year of operation for the AWP as it currently stands, the Evaluators provide the following recommendations that the utilities or agencies may consider when moving forward with weatherization services under the Consistent Weatherization Approach framework:

Mitigate Quality of Work Issues: The quality of work issues identified by the Evaluators during on-site verifications during 2015 suggest that additional training or verification may be needed for contractors in the Pine Bluff region. Overall, the Evaluators suggest that additional quality assurance and training be conducted with any new contractors who are brought onto the IOUs' Consistent Weatherization Approach offerings.

Record and Report Air Infiltration Details: As with prior years, the Evaluators identified discrepancies between reported air infiltration leakage rates and verified air infiltration leakage rates. Although only nine homes received blower door testing as part of the 2015 evaluation, the majority of these homes showed verified infiltration rates that were higher than reported infiltration rates. Moving forward, the Evaluators recommend that the IOUs and contractors collect and report the itemized air infiltration measures that are installed. As it is very difficult to reliably replicate blower door results during a site visit, having this additional information will allow program staff or their EM&V contractors to verify that the work was performed properly.

Table 1-8 Recommendations from 2015 Program Year Evaluation

Issue	Consequences	Recommendation
The Evaluators identified significant issues with the quality of work in two homes during the on-site verification efforts	Some measures were not eligible for savings Negatively affects customer satisfaction	Contractors joining Consistent Weatherization Approach offerings, namely in the Pine Bluff area, should receive additional training and undergo quality control procedures that ensure sufficient customer service and installation of measures.
The reported air infiltration leakage rates appear skewed downward, based on the Evaluators' site visits.	Possible issues with measure implementation or data collection Possible discrepancies between implementation and verification that will lead to skewed realization rates.	Record and report itemized air infiltration measures in the tracking data so that it is possible to verify individual measure elements. Also, Include any field notes related to the blower door test in the tracking data so that testing conditions can be more accurately replicated.

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1.4 Report Organization

The report is organized as follows:

- Chapter 2 presents the impact findings and discusses the methods used for, and the results obtained from, estimating gross and net savings for the program;
- Chapter 3 presents the results of the process evaluation tasks and additional program findings; and
- Chapter 4 presents key conclusions and recommendations from the evaluation of the program.
- Appendix A presents the participant survey instrument.

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2. Impact Evaluation Findings

This chapter presents the results of the measure verification and savings calculations for the Arkansas Weatherization Program (AWP) in the 2015 program year.

2.1 Glossary of Terms

As a first step to detailing the evaluation methodologies, the Evaluators provide a glossary of terms to follow:

- *Ex Ante Savings* – Energy savings as determined and reported by program implementers/sponsoring utilities prior to evaluation by EM&V contractor
- *Ex Post Gross Savings* – Energy savings as determined by the EM&V contractor through engineering analysis, statistical analysis, and/or onsite verification
    - *Gross Realization Rate* – Ratio of *Ex Post* Gross Savings / *Ex Ante* Savings
- *Ex Post Net Savings* – *Ex Post* Gross savings x Net-to-Gross Ratio
    - *Net-to-Gross Ratio (NTGR)* = (1 – Free-Ridership % + Spillover %), also defined as *Ex Post* Net Savings / *Ex Post* Gross Savings[6]

2.2 Summary of Ex Ante Savings

The Arkansas Weatherization Program is designed to use both electric and gas utility funds to assist customers with the cost of the in-home audit and energy efficient measures. Table 2-1 presents the overall *ex ante* savings by measure. These values are based on the claimed savings values within the EnerTrek software tool. Exports of these data were provided to the Evaluators for analysis and verification purposes.

[6] The net-to-gross ratio for the AWP in 2015 is 1, thus 100% of gross savings are counted as net savings.

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Table 2-1 Ex Ante Savings by Measure Type – Overall

Measure	*Peak Demand Savings (kW)*	*Annual Savings (kWh)*	*Peak Demand Savings (Therms)*	*Annual Savings (Therms)*
Air Infiltration	42.48	93,780.49	15,543.67	468.42
Ceiling Insulation	30.14	65,457.60	4,481.13	77.22
Central AC Replacement	2.60	6,140.00	-	-
Direct Vent Heater	-	-	716.63	10.92
Duct Sealing Installation	-	-	-	-
Floor Insulation	0.07	896.54	8.73	-
Gas Central Replacement	-	-	562.92	8.69
Heat Pump Replacement	1.07	5,881.00	-	-
Refrigerator Replacement	0.36	2,451.06	-	-
Residential Lighting	3.36	24,679.10	(0.13)	-
Smart Thermostat	-	369.00	307.38	-
Storm Windows	0.01	28.30	29.20	0.62
Wall Insulation	0.41	502.17	182.37	3.24
Water Heater Insulation	0.01	68.00	18.64	0.03
Water Heater Pipe Insulation	0.02	413.21	59.09	0.12
Window AC	0.77	429.49	-	-
Window Replacement	12.55	15,433.52	439.70	16.92
Total	93.85	216,529.48	22,349.33	586.19

2.2.1 Ex Ante Savings for Electric Utilities

The electric utilities with participating homes in the AWP during 2015 were AEP-SWEPCO and EAI. Table 2-2 presents the *ex ante* savings of the electric IOUs for the 2015 program year.

Table 2-2 Ex Ante Savings by Electric Utility

Electric Utility	*# of Homes*	*Peak Demand Savings (kW)*	*Annual Savings (kWh)*
AEP-SWEPCO	13	19.03	43,301.99
EAI	68	59.64	149,883.95
OG&E	0	-	-
Non-IOU	13	15.18	23,343.54
Total	94	93.85	216,529.48

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Table 2-3 and Table 2-4 summarize the *ex ante* savings by measure for the two electric utilities that had participating homes during 2015. The "Non-IOU" category refers to savings that were achieved as a result of program services, but were not attributable to the investor-owned utilities (IOUs) that fund the Arkansas Weatherization Program.

Table 2-3 Ex Ante Savings by Measure Type – AEP-SWEPCO

Measure	*Peak Demand Savings (kW)*	*Annual Savings (kWh)*
Air Infiltration	6.44	11,866.75
Ceiling Insulation	7.10	17,619.29
Central AC Replacement	0.92	2,330.00
Direct Vent Heater	-	-
Duct Sealing Installation	-	-
Floor Insulation	-	-
Gas Central Replacement	-	-
Heat Pump Replacement	0.40	2,108.00
Refrigerator Replacement	0.05	322.99
Residential Lighting	0.59	3,926.66
Smart Thermostat	-	96.00
Storm Windows	-	-
Wall Insulation	-	-
Water Heater Insulation	-	-
Water Heater Pipe Insulation	0.00	75.88
Window AC	-	-
Window Replacement	3.53	4,956.42
Total	19.03	43,301.99

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Table 2-4 Ex Ante Savings by Measure Type - EAI

Measure	*Peak Demand Savings (kW)*	*Annual Savings (kWh)*
Air Infiltration	27.91	71,936.77
Ceiling Insulation	18.64	41,858.33
Central AC Replacement	1.22	2,645.00
Direct Vent Heater	-	-
Duct Sealing Installation	-	-
Floor Insulation	0.07	896.54
Gas Central Replacement	-	-
Heat Pump Replacement	0.67	3,773.00
Refrigerator Replacement	0.29	1,960.06
Residential Lighting	2.21	16,620.58
Smart Thermostat	-	203.00
Storm Windows	0.00	13.00
Wall Insulation	0.41	502.17
Water Heater Insulation	0.01	68.00
Water Heater Pipe Insulation	0.02	314.98
Window AC	0.77	429.49
Window Replacement	7.44	8,663.03
Total	59.64	149,883.95

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Table 2-5 presents the *ex ante* electric savings that were not associated with any IOU. These *ex ante* savings are attributable to municipal utilities, co-op utilities, or other energy providers. These savings are not attributed to any specific program sponsoring utility, and are provided for reference only.

Table 2-5 Ex Ante Savings by Measure Type – Non-IOU (Electric)

Measure	*Peak Demand Savings (kW)*	*Annual Savings (kWh)*
Air Infiltration	8.13	9,976.98
Ceiling Insulation	4.40	5,979.97
Central AC Replacement	0.46	1,165.00
Direct Vent Heater	-	-
Duct Sealing Installation	-	-
Floor Insulation	-	-
Gas Central Replacement	-	-
Refrigerator Replacement	-	-
Residential Lighting	0.02	168.01
Smart Thermostat	0.57	4,131.85
Storm Windows	-	70.00
Wall Insulation	0.01	15.30
Water Heater Insulation	-	-
Water Heater Pipe Insulation	-	-
Window AC	0.00	22.36
Window Replacement	-	-
Total	15.18	23,343.54

2.2.2 Ex Ante Savings for Gas Utilities

The only IOU with participating homes during 2015 was CenterPoint. Table 2-6 presents the *ex ante* savings of each IOU for the 2015 program year.

Table 2-6 Ex Ante Savings by Gas Utility

Gas Utility	*# of Homes*	*Peak Demand Savings (Therms)*	*Annual Savings (Therms)*
AOG	0	-	-
CenterPoint	76	547.99	20,700.42
Black Hills	0	-	-
Non-IOU	18	38.20	1,648.90
Total	94	586.19	22,349.33

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Table 2-7 summarizes the *ex ante* savings by measure CenterPoint, the only gas IOU with participating homes in 2015.

Table 2-7 Ex Ante Savings by Measure Type – CenterPoint

Measure	*Peak Demand Savings (Therms)*	*Annual Savings (Therms)*
Air Infiltration	442.52	14,656.74
Ceiling Insulation	67.46	3,921.32
Central AC Replacement	-	-
Direct Vent Heater	9.77	641.63
Duct Sealing Installation	-	-
Floor Insulation	-	8.73
Gas Central Replacement	8.69	562.92
Refrigerator Replacement	-	-
Residential Lighting	-	-
Smart Thermostat	-	(0.12)
Storm Windows	-	226.38
Wall Insulation	0.62	26.30
Water Heater Insulation	3.24	182.37
Water Heater Pipe Insulation	0.03	18.64
Window AC	0.11	55.56
Window Replacement	-	-
Total	547.99	20,700.42

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Table 2-8 presents the *ex ante* gas savings that were not associated with any AWP IOU. The "non-IOU" *ex ante* gas savings may represent propane customers or other types of customers that do not receive gas service from an IOU. Therefore, Table 2-8 is a reflection of the non-IOU *ex ante* gas savings that are claimed within the tracking system, and these savings are not applicable to any specific service provider.

Table 2-8 Ex Ante Savings Values by Measure Type – Non-IOU (Gas)

Measure	*Peak Demand Savings (Therms)*	*Annual Savings (Therms)*
Air Infiltration	468.42	15,543.67
Ceiling Insulation	77.22	4,481.13
Central AC Replacement	-	-
Direct Vent Heater	10.92	716.63
Duct Sealing Installation	-	-
Floor Insulation	-	8.73
Gas Central Replacement	8.69	562.92
Refrigerator Replacement	-	-
Residential Lighting	-	-
Smart Thermostat	-	(0.13)
Storm Windows	-	307.38
Wall Insulation	0.62	29.20
Water Heater Insulation	3.24	182.37
Water Heater Pipe Insulation	0.03	18.64
Window AC	0.12	59.09
Window Replacement	-	-
Total	586.19	22,349.33

2.3 Gross Savings Calculation Methodology

For measures implemented through the 2015 program, savings verification was performed according to methodologies described in TRM V5.0. Table 2-9 identifies the sections in the TRM that were used for verification of measure-level savings under the AWP.[7]

[7] The savings for storm windows were calculated through NEAT/MHEA, and these measures do not have an associated savings algorithm section in the TRM. However, Appendix H in TRM V5.0 specifies that NEAT/MHEA peak savings for storm windows should be multiplied by a deemed demand factor. This approach was used for the 2015 evaluation.

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Table 2-9 TRM Sections by Measure Type

Measure	*TRM Version*	*Section in TRM*
Air Infiltration	5.0	2.2.9
Ceiling Insulation	5.0	2.2.2
Central AC Replacement	5.0	2.1.6
ENERGY STAR® Windows	5.0	2.2.7
Floor Insulation	5.0	2.2.4
Gas Furnace Replacement	5.0	2.1.3
Heat Pump Replacement	5.0	2.1.8
Lighting Efficiency	5.0	2.5.1
ENERGY STAR® Refrigerator	5.0	2.4.3
Smart Thermostat	5.0	2.1.12
Storm Windows	5.0	Appendix H
Direct Vent Heaters	5.0	2.1.1
Wall Insulation	5.0	2.2.3
Water Heater Jackets	5.0	2.3.2
Water Heater Pipe Insulation	5.0	2.3.3
Window AC	5.0	2.1.10

Air infiltration reduction and ceiling insulation accounted for the majority of both gas and electric savings for the AWP in 2015. Residential lighting (CFL installation) also accounted for a substantial portion of electric savings. The calculation methodologies for these three measures are detailed in the following sections.

The deemed savings algorithms in TRM 5.0 for air infiltration reduction were developed through simulation modeling in BEopt, a residential building simulation modeling platform that uses the DOE EnergyPlus simulation engine. Multiple equipment configurations were simulated in each of the four Arkansas weather zones in developing savings values denominated in deemed savings per CFM50 of air leakage rate reduction. The following table summarizes the deemed savings values for Weather Zone 7.

Table 2-10 Deemed Savings Values for Air Infiltration Reduction, Zone 7

Equipment Type	*kWh Savings / CFM50 (ESF)*	*kW Savings / CFM50 (DSF)*	*Therm Savings / CFM50 (GSF)*	*Peak Therms / CFM50 (GPSF)*
Electric AC with Gas Heat	0.190	0.00016	0.0707	0.002181
Gas Heat Only (no AC)	0.053	n/a	0.0747	0.002181
Elec. AC with Resistance heat	1.812	0.00016	N/A	N/A
Heat Pump	0.818	0.00016	N/A	N/A

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The following example considers a residence in Weather Zone 7 with electric AC and gas heat. If the residence had a leakage rate of 16,100 CFM_{50} before air infiltration reduction and a leakage rate of 7,220 CFM_{50} after, then the residence would have an annual gross savings of 1,687 kWh.

$$Air\ Infiltration\ Savings = 0.190 \frac{kWh\ Savings}{CFM_{50}} \cdot \left(16{,}100\ CFM_{50\ pre} - 7{,}220\ CFM_{50\ post}\right)$$

$$Air\ Infiltration\ Savings = 1{,}687\ kWh$$

TRM V5.0 also specifies Minimum Final Ventilation Rates (MVR) and Maximum Pre-installation Infiltration Rates in order to ensure that air infiltration work is performed in accordance with health and safety guidelines and that infiltration reduction is not attempted on homes with prohibitively severe leakage levels.

TRM V5.0 specifies that the MVR must comply with current Arkansas building codes, which present three options for calculating MVR. However, as per Protocol E2 of TRM V5.0, the enforcement date for a code or standard update is the end of the current program year if the effective date of the code or standard update is before July 1. Therefore the Evaluators applied the MVR guidelines from TRM V4.0 for the 2015 evaluation. TRM V4.0 specifies MVR as follows:

The MVR specifies the minimum post-installation air infiltration value that can be applied to the deemed savings calculation. If a home's final CFM50 value is below the MVR, the deemed savings calculation for air infiltration reduction on the home is calculated using the MVR rather than the actual post-installation leakage value.

The MVR for a given home is calculated as follows:

$$Min\ CFM50 = [0.01 \times A_{floor} + 7.5 \times (BR + 1)] \times N$$

Where:

Min CFM50 = Minimum final ventilation rate (CFM50)

AFloor = Floor area (ft^2)

BR= Number of bedrooms (must be at least 1)

N = N factor (deemed value based on type of wind shielding and number of stories in home)

With regard to Maximum Pre-installation Infiltration Rate, TRM 5.0 specifies that in order to avoid incentivizing homes with severe building envelope issues that cannot be remedied with typical air infiltration procedures, the baseline pre-installation infiltration rate should be based on a maximum air change rate of 3.0. With this baseline in effect, the maximum allowable pre-installation CFM50 value is calculated as follows:

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$$CFM_{50,pre}/ft^2 = \frac{ACH_{Nat,pre} \times h \times N}{60}$$

Where:

CFM50,pre /ft^2 = Per square foot pre-installation infiltration rate (CFM50/ft^2)

ACHNat,pre = Maximum pre-installation air change rate (ACHNat) = 3.0

60 = Constant to convert from minutes to hours

h = Ceiling height (ft) = 8.5 (default)

N = N factor (deemed value based on type of wind shielding and number of stories in home)

If a home's pre-installation infiltration rate exceeds the rate calculated above, the Maximum Pre-installation Infiltration Rate is used for deemed savings calculations.

Additionally, TRM 5.0 specifies a maximum CFM50 per-square-foot value. For deemed savings calculations, pre-installation leakage rates cannot exceed these values.

2.3.1 Ceiling Insulation Savings Calculations

The deemed savings algorithms in TRM 5.0 for ceiling insulation were developed through simulation modeling in BEopt, a residential building simulation modeling platform that uses the DOE EnergyPlus simulation engine. Multiple equipment configurations were simulated in each of the four Arkansas weather zones in developing savings values denominated in deemed savings per square footage of ceiling area. Table 2-11 summarizes the deemed savings values for R-38 insulation for participants located in Weather Zone 8.

Table 2-11 Deemed Savings Values for Ceiling Insulation, Zone 8

Ceiling Insulation Base R-value	*AC/Gas Heat kWh*	*Gas Heat (no AC) kWh*	*Gas Heat (no AC) Therms*	*AC/Electric Resistance kWh*	*Heat Pump kWh*	*AC Peak Savings (kW)*	*Peak Gas Savings[8] (therms)*
	(/ sq. ft.)	*(/ sq. ft.)*	*(/ sq. ft.)*	*(/ sq. ft.)*	*(/ sq. ft.)*	*(/ sq. ft.)*	*(/ sq. ft.)*
0 to 1	1.8642	0.2203	0.3060	8.734	4.572	0.00107	0.00539
2 to 4	1.0497	0.1215	0.1687	4.846	2.495	0.00061	0.00284
5 to 8	0.6330	0.0728	0.1011	2.909	1.495	0.00038	0.00165
9 to 14	0.3909	0.0446	0.0618	1.784	0.917	0.00025	0.00099
15 to 22	0.1847	0.0216	0.0299	0.858	0.439	0.00011	0.00048

[8] Data in table are for Blytheville peak. Other Zone 8 peaks can be calculated by multiplying Blytheville peak by the appropriate factor, m. For Jonesboro, m=0.890 (0-1), m = 0.901 (2 to 4), 0.906 (5 to 8), 0.907 (9 to 14), 0.918 (15 to 22). For Fort Smith, m=0.859 (0-1), m = 0.872 (2 to 4), 0.878 (5 to 8), 0.879 (9 to 14), 0.891 (15 to 22).

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The following example considers a residence that had R-38 insulation installed in Weather Zone 8 with a heat pump, and a pre-retrofit R-value of ceiling insulation in the range of 9 to 14. If the residence has a ceiling area of 1,200 sq. ft., then the residence would have an annual gross savings of 1,100 kWh.

$$Ceiling\ Insulation\ Savings = 0.917 \frac{kWh}{ft^2} \cdot (1{,}200\ ft^2) = 1{,}100\ kWh$$

TRM 5.0 specifies an efficiency standard of R-38, meaning that in order to qualify for deemed savings the combined R-value of existing and added insulation should be at least R-38.

2.3.2 Compact Fluorescent Lamps (CFLs) Savings Calculations

The deemed savings for compact fluorescent lamps can be calculated by using the following equation.

$$kWh_{savings} = ((Watts_{base} - Watts_{post})/1{,}000)\ x\ Hours\ x\ ISR\ x\ IEF_E$$

The inputs, which assume the following prerequisite knowledge, can be found in Section 2.5.1 of TRM V5.0:

- The quantity, lumens, and wattages post fixtures;
- Whether or not the retrofits were time of sale or direct install (this defines the in-service rate); and
- The heating type of the residence.

For example, if in March 2015 (5) 13W and 800 lumen CFLs were directly installed in a residence with gas heating, the residence would have an annual gross savings of 128 kWh.

$$kWh_{savings} = ((5 \cdot 43 - 5 \cdot 13)/1{,}000 \cdot 792.6 \cdot 0.98 \cdot 1.10 = 128\ kWh$$

TRM 5.0 includes specifications for heating penalties from CFLs in natural gas heated homes, calculated as follows:

$$Therms_{penalty} = \left((W_{base} - W_{post})/1000\right)\ x\ ISR\ x\ IEF_G$$

Where:

IEFg = Interactive Effects Factor to account for gas heating penalties

TRM V5.0 also accounts for future changes in lighting baselines as per EISA 2007 guidelines. Specifically, TRM V5.0 specifies that the 1st Tier EISA 2007 baselines come into effect in January 2014, and that the 2nd Tier EISA 2007 baselines come into effect in January 2022. These baseline changes affect lifetime savings calculations for CFLs.

As per Protocol E2 of TRM V5.0, the enforcement date for a code or standard update is the end of the current program year if the effective date of the code or standard update is

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before July 1. Thus, the Evaluators calculated 2015 first-year savings using the 1st Tier EISA baseline.

2.4 Net Savings Determination

As with prior program years, the Evaluators applied a net-to-gross ratio of 1 for savings achieved through the program in 2015. The context for and explanation of this determination, which appeared in prior AWP evaluation reports, is provided below.

The Evaluators conducted a net-to-gross assessment of the program in 2012 in order to determine the likelihood of significant free-ridership or savings spillover. Feedback obtained from customers, community action agencies, and utility staff indicates that the likelihood for program free-ridership is very low. As a high percentage of AWP participants qualified for and participated in the income-qualified statewide Weatherization Assistance Program (WAP), they are unlikely to be candidates for free-ridership in the AWP.

The promotional structure of the AWP targets customer groups who would be very unlikely to pursue these weatherization projects in the absence of the program, and who would likely not seek out an energy audit at their own cost. Additionally, participants who were visited by the Evaluators' field staff were asked a series of questions related to program savings spillover, and none of these customers identified any potential spillover savings.

Due to these factors, the Evaluators determined the net-to-gross ratio for the Arkansas Weatherization Program to be 1, or 100% of gross savings, for the 2012 program year. This determination has been carried over and applied to the 2015 program year, and 2015 AWP gross savings are equal to net savings.

2.5 On-site Verification Procedure

In addition to TRM verification, the Evaluators conducted on-site field verification of a sample of participant homes. This process involved reviewing tracking information and inspecting the completeness and accuracy of the implemented measures. This section provides a summary of the methodology used by the Evaluators to conduct the verification activity.

2.5.1 Verification Sampling Methodology

The Evaluators conducted a random sample of participants for the ex-post verification process. The sample size for verification was calculated to meet 90% confidence and 10% precision (90/10) for the overall 2015 program population at the time of the on-site verification activity. The main purpose of the verification activity was to determine whether measures were properly installed in the quantities reported in program tracking data. Thus, the coefficient of variation (CV) used for sampling was not based on participant savings but was assumed to be 0.5, which is a commonly assumed CV value for residential program evaluations. The resulting sample size is estimated as:

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$$n_0 = \left(\frac{1.645 * CV}{RP}\right)^2$$

Where,

1.645 = Z Score for 90% confidence interval in a normal distribution

CV = Coefficient of Variation

RP = Required Precision, 10% in this evaluation

With 10% required precision (RP), this calls for a sample of 68 for programs with a sufficiently large population. However, for programs with lower levels of participation, a finite population correction is used to maintain cost-effective verification while meeting precision goals. For the AWP, the Evaluators applied a finite population correction factor as follows:

$$n = \frac{n_0}{1 + {}^{n_0}/_{N}}$$

Where

n_0 = Sample Required for Large Population

N = Size of Population

n = Corrected Sample

During 2015, 94 residences received measures through the AWP. After applying the population correction factor, the program calls for a sample size of 40 participants.

In total, the Evaluators attempted to schedule 28 site visits but due to the limited number of participants in the program population, as well as cancellations and customer absences, Evaluator field staff members were able to conduct on-site visits for 13 program participants. This does not meet the sampling requirement specified above. To supplement the verification effort, the Evaluators conducted participant satisfaction surveys with 24 customers which also served to confirm that they had participated in and received measures through the program. Of these 24 survey respondents, 9 were also part of the group of 13 customers who received on-site verification visits from the Evaluators. Thus, 13 customers received on-site measure verification, and 15 additional customers received program participation verification through the participant survey. This was supplemented by 12 brief telephone verification calls to bring the total number of unique customer verifications to 40.

Although the participant satisfaction survey did not verify individual measure installation, the Evaluators were able to confirm that all 40 sampled customers had participated in the program. The sample achieved for the evaluation is not representative of the population

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at the measure level, but it is representative at the project level in verifying customer participation.

2.5.2 On-site Verification Procedure

The primary goal of field verification was to ensure that the reported measures were installed and operating correctly in participant homes. Participants were given Walmart gift cards for their time; these were in the amount of $25. During the on-site visits, the Evaluators' field technicians accomplished the following:

- Verified the implementation status of the measures; verified that the measures were installed, that they were installed correctly, and were functioning properly. Photographs were taken of most of the installed measures.
- Data collected at each site focused on obtaining more specific information regarding the characteristics of the home where the measures were implemented.

A field visit form was completed for each visited site in order to document measure quantities, home characteristics, and any needed additional commentary regarding the visit. Specifically, the field form included the following fields:

- Home Characteristics: The field engineer documented the type of home (i.e. single story vs. multi-story), number of bedrooms, number of bathrooms, total conditioned area, and heating type.
- Measure Quantity Verification: The engineer documented reported vs. actual quantities of each measure type (e.g. CFLs, water heater measures) and any applicable notes regarding burnt out bulbs or non-operational equipment.
- Insulation Assessment: The form includes fields for insulation square footage, the R-value or inches of insulation, and the type of insulation (e.g. blown cell).
- Infiltration Assessment: For homes receiving air infiltration measures, the field engineer conducted a blower door test and recorded ex-post leakage for comparison with reported leakage values.
- Supplemental Notes: The field engineer recorded any notable comments provided by the customer regarding the work that was performed, and identified any verification issues that had occurred during the visit (e.g. if the attic was not accessible).

2.6 Onsite Verification Results

As described in Section 2.5 of this report, the Evaluators conducted onsite verification visits to 13 participant homes. These site visits were conducted in order to verify complete and proper measure installation, to conduct post-implementation measurements, and to

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collect information regarding residence characteristics such as square footage and heating type.

The field and telephone verification activity showed that the weatherization measures had for the most part been installed in the quantities reported within program tracking data, although quality of work issues were identified in two homes. This section summarizes the verification findings by measure category.

Specific notes regarding the onsite and telephone verification findings include:

2.6.1 Contact Information

All residences were located at the addresses provided within the tracking data. Additionally, a high percentage of telephone numbers were found to be accurate, which is an improvement over the 2014 program year. In total, only 4 out of the 54 telephone numbers (7%) dialed by the Evaluators were found to be disconnected or incorrect during the site visit scheduling process.

2.6.1 Air Infiltration

The Evaluators conducted blower door testing in nine participant homes for the 2015 program year. Of these homes, the CFM_{50} value measured during the verification visit was within 10% of the reported value for four homes. The Evaluated CFM_{50} value was more than 10% greater than the Reported CFM50 value for four homes. Overall, the Evaluated CFM_{50} value was greater than the Reported CFM_{50} value for six of the nine homes.

As mentioned in prior evaluation reports for this program, there are several factors that may cause the Evaluated CFM50 value to be greater than the Reported CFM_{50} value, including customer actions following the weatherization work (such as removing door sweeps), methodological differences between contractor blower door testing and Evaluator blower door testing, and environmental or weather effects. Without additional information regarding air sealing and leakage testing procedures conducted by contractors for each home, it is not possible to determine the reason for these measurement discrepancies. The Evaluators have previously recommended that itemized air infiltration measures be included in program tracking data, but this may be associated with a database programming cost. Similarly, field notes regarding how the initial blower door test was conducted (such as whether a fireplace flue was open or closed) may be useful for the verification process but generating a report of this information may require additional EnerTrek programming.

Overall, increasing the level of tracking data detail and minimizing methodological differences among contractors would help to distinguish data entry and implementation errors from situational and procedural differences. As this is the final year of program operation, moving forward this issue may only be relevant to IOUs who will continue to

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use community action agency contractors to provide services under the Consistent Weatherization Approach framework.

2.6.1 Attic Insulation

All reported instances of attic insulation were verified. There were no significant differences between reported pre-installation R values and evaluated pre-installation R values. There were no significant differences between reported square footage and evaluated square footage.

2.6.1 CFLs

All reported instances of CFL installation were verified, in quantities that matched or closely matched program tracking data. All verified CFLs matched the wattage and lumen range reported in the EnerTrek tracking data.

2.6.2 Water Heater Jacket and Pipe Wrap

The Evaluators were able to verify all but one instance of water heater jackets. In this case, the Evaluators found that silver bubble wrap had been used to wrap the water heater, rather than standard insulation jackets. The agency responsible for this work reported that the silver bubble wrap is no longer being used. All reported instances of water heater pipe wrap were verified, but in at least two cases the pipe wrap was installed on the pressure release valve line. The agency responsible for this work reported that the water heater pipe wrap had been installed on the proper lines during the initial inspection of the home.

2.6.3 Central Air Conditioner Replacement

All but one reported instance of central air conditioning replacement were verified. One customer did not appear to have had a new unit installed, and their existing unit was not functioning at the time of the site visit.

2.6.4 Gas Heat Replacement

All reported instances of gas central replacement were verified.

2.6.5 Window Replacement

All reported instances of window replacement were verified.

2.6.6 Smart Thermostat

All reported instances of smart thermostat installation were verified.

2.6.7 Wall Insulation

All reported instances of wall insulation were verified.

2.6.8 Refrigerator Replacement

All reported instances of refrigerator replacement were verified.

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2.6.9 Direct Vent Heater

All reported instances of direct vent heater installation were verified.

The results of the verification activity suggest that measures are for the most part installed in the quantities reported in program tracking data. However, the Evaluators found that the quality of work conducted in the two sampled homes serviced by PBJCEOC was fairly poor. This includes the instances of bubble wrap and pipe insulation on pressure relief line mentioned above. Overall, issues identified within these homes include:

- It appeared that silver bubble wrap was used as water heater insulation, rather than a standard insulation jacket;
- Plenum sealing was done with tape that did not effectively stick to surfaces;
- Caulk was used in gaps that were too large, where foam sealing should have been used;
- Water heater pipe insulation was added to the pressure release line; and
- One customer indicated that the contractor had damaged paint/trim in the home.

These findings were submitted to CADC and PBJCEOC staff responded, indicating that the silver water heater wrap is no longer being used and that the water heater pipe insulation had been added to the proper lines when the home was inspected. However it may be beneficial to conduct further training with PBJCEOC staff in order to ensure that they are complying with industry quality standards, and that they are providing adequate customer service to participants. As a result of the field verification activity, the Evaluators made the following adjustments to program savings:

- No water heater tank wrap savings were attributed to the home where silver bubble wrap was used instead of standard tank insulation;
- No water heater pipe wrap savings were attributed to the two homes where the pipe wrap was installed on the pressure relief valve; and
- No central air conditioner savings were attributed to the home where the central air conditioner did not appear to have been replaced.

Rather than extrapolating these savings adjustments to the program population based on the limited sample of 13 site visits that were conducted, these adjustments only affected the individual homes where the verification issue occurred.

2.7 Review of EnerTrek Input Assumptions

Although the EnerTrek system calculated savings for the AWP using protocols in TRM V4.0, some of the measure inputs required by the TRM were not collected by program contractors during 2015. In order to calculate savings, Frontier Associates developed input assumptions for individual measure types. The Evaluators reviewed these assumptions and attempted to validate or supplement specific assumptions during the

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verification activity. The assumptions applied to individual measure calculations for some homes in 2015 include:

- ENERGY STAR® Refrigerator Replacement: For measures where an early retirement savings methodology can be applied, but a unit age is not provided, savings were calculated using the Replace on Burnout methodology.
- Central AC Replacement: For measures where an early retirement savings methodology can be applied, but a unit age is not provided, savings were calculated using the Replace on Burnout methodology.
- Direct Vent Heaters: For measures where an early retirement savings methodology can be applied, but a unit age is not provided, savings were calculated using the Replace on Burnout methodology.
- Gas Central Replacement: Assume replace on burnout.
- Heat Pump Replacement: Assume replace on burnout.
- Water Heater Pipe Insulation: Assume water heater is located in a conditioned space.

Data collected by the Evaluators during the verification activity indicated that the assumptions for CFLs and window replacements were reasonable and consistent with actual measure characteristics.

Overall, following a review of program tracking data and field verification findings, the Evaluators determined that all of the listed assumptions were reasonable for measures implemented during 2015.

2.8 Ex Post Net Savings by Measure

Ex post savings were calculated through TRM verification of EnerTrek inputs and *ex ante* savings values. Any instances of discrepancies between *ex ante* and *ex post* savings were due to one of three issues:

- Difference in TRM: EnerTrek calculated measure savings in 2015 using TRM V4.0, and the Evaluators conducted savings verification using TRM V5.0. There were differences in input assumptions, measure parameters, and savings equations between the two TRM versions for some measures.

- Calculation Error: Any difference in interpretation of TRM protocols, mathematical errors, or data entry errors may cause *ex ante* savings to be higher or lower than *ex post* (verified) savings.

- On-site Verification Issues: Measures that were unable to be verified during verification visits at participant's homes received zero savings.

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Table 2-12 presents electric and gas realization rates by measure category. These realization rates are presented at the program level, and individual utility realization rates may vary from those presented in this table. Individual utility realization rates are presented in Section 2.10 and Section 2.11.

Table 2-12 Gas and Electric Realization Rates by Measure Type

Measure	*kWh Realization Rate*	*kW Realization Rate*	*Therms Realization Rate*	*Peak Therms Realization Rate*
Air Infiltration	100%	100%	100%	100%
Ceiling Insulation	101%	149%	102%	101%
Central AC Replacement	71%	161%	-	-
Direct Vent Heater	-	-	162%	162%
Duct Sealing Installation	-	-	-	-
Floor Insulation	75%	68%	100%	-
Gas Central Replacement	-	-	107%	108%
Heat Pump Replacement	49%	52%	-	-
Refrigerator Replacement	178%	178%	-	-
Residential Lighting	110%	118%	230%	-
Smart Thermostat	1909%	-	129%	-
Storm Windows	100%	125%	100%	146%
Wall Insulation	104%	131%	107%	0%
Water Heater Insulation	0%	0%	100%	100%
Water Heater Pipe Insulation	96%	98%	100%	102%
Window AC	148%	100%	-	-
Window Replacement	100%	100%	100%	100%
Overall	103%	118%	103%	101%

The Evaluators found that the majority of discrepancies between *ex ante* and *ex post* savings were due to differences between TRM V4.0 and TRM V5.0 rather than due to calculation errors.

The following list identifies measure categories where there were significant differences between *ex ante* and *ex post* savings, and specifies whether this was due to differences in TRM versions or due to calculation errors:

- Ceiling Insulation
    - Difference in TRM: High overall electric and gas realization rates were due to differences in TRM versions. TRM V5.0 provides deemed saving tables for both R-38 and R-49 and allows for linear interpolation for insulation that

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is between the two R-values. TRM V4.0 only provides a deemed savings table for R-38 insulation.

- Floor Insulation
  - Calculation Error: Low overall electric realization rates are due to differences in TRM versions. Deemed savings in TRM V5.0 included negative energy savings values depending on weather zone and HVAC equipment configuration. The simulation procedures used for this measure in TRM V5.0 identified negative electric savings, likely caused by the floor insulation acting as a barrier to ground cooling effects. This would cause the home temperature to be higher during cooling months, likely resulting in increased air conditioner usage. The *ex ante* savings calculation did not allow for homes to receive negative energy savings for floor insulation while realized savings incorporated this increased energy usage.
- Wall Insulation
  - Difference in TRM: High overall electric and gas realization rates were due to differences in TRM versions. TRM V5.0 provides deemed saving tables for both R-13 and R-23 and allows for linear interpolation for insulation that is between the two R-values. TRM V4.0 only provides a deemed savings table for R-13 insulation.
- Residential Lighting
  - Difference in TRM/Calculation Error: High overall electric and gas realization rates were due to differences between TRM versions and possible EnerTrek calculation issues. CFL annual kWh savings in EnerTrek may have been calculated as an increment of lifetime savings, which takes into account future baseline changes that should not affect first-year kWh savings. Additionally, the interactive effects factor to account for gas heating penalties was updated in TRM V5.0.
- Refrigerator Replacement
  - Difference in TRM/Calculation Error: High overall electric realization rates were due to differences between TRM versions and possible EnerTrek calculation issues. Refrigerator annual kWh savings in EnerTrek may have been calculated as an increment of lifetime savings, which takes into account future baseline changes that should not affect first-year kWh savings. ADM also assigned TRM V5.0 refrigerator types based on the model number of the efficient refrigerator provided in the tracking data.
- Central AC Replacement
  - Difference in TRM: The low kWh realization rate and high kW realization rate is due to differences in TRM versions. TRM V4.0 provides a deemed

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savings table while TRM V5.0 provides a savings algorithm requiring additional measure specific inputs. Additionally, it did not appear that this measure was in place in one of the sites visited during on-site verification, and that instance of this measure was not attributed with savings.

- Direct Vent Heater
  - Calculation Error: High overall electric realization rates were due to differences between TRM versions and possible EnerTrek calculation issues. Direct vent heater annual kWh savings in EnerTrek may have been calculated as an increment of lifetime savings, which takes into account future baseline changes that should not affect first-year kWh savings. In addition, in cases where existing unit exceeded the age of eligibility that can be claimed as early retirement according to Section 1.8 of TRM V5.0, replacement on burnout methodology was used.
- Gas Central Replacement
  - Difference in TRM/Calculation Error: High overall gas realization rates were due to differences in TRM versions and possible EnerTrek calculation issues. Gas Central Replacement annual kWh savings in EnerTrek may have been calculated as an increment of lifetime savings, which takes into account future baseline changes that should not affect first-year kWh savings. In addition, in cases where existing unit exceeded the age of eligibility that can be claimed as early retirement according to Section 1.8 of TRM V5.0, replacement on burnout methodology was used. Finally, heating load value and equivalent full hours were updated in TRM V5.0.
- Heat Pump Replacement
  - Difference in TRM/Calculation Error: The low electric realization rates are due to differences in TRM versions. TRM V4.0 provides a deemed savings table while TRM V5.0 provides a savings algorithm requiring additional measure specific inputs.
- Smart Thermostat
  - Difference in TRM: The high electric and gas realization rates are due to differences in TRM versions. Smart Thermostats were added for TRM V5.0. Previous evaluations relied on NEAT savings values.
- Storm Windows
  - Difference in TRM: The high peak savings realization rates are due to differences in TRM versions. TRM V5.0 provides updated multipliers used estimating peak demand reductions.
- Water Heater Pipe Insulation

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- Difference in TRM/On-site Verification Issues: The low electric realization rates are due to an adjustment made by the Evaluators based on on-site verification results. This is described in more detail in Section 2.6. The high peak gas realization rates are due to updates to TRM V5.0.

- Water Heater Pipe Insulation
  - The 0% electric realization rate is due to an adjustment made by the Evaluators based on on-site verification results. This is described in more detail in Section 2.6.
- Window AC
  - Difference in TRM: The high overall electric realization rates are due to differences in TRM versions. The room adjustment factor was updated for TRM V5.0 causing an increase in savings.

2.9 Overall Ex Post Net Savings

Table 2-13 presents the savings results of the evaluation of the 2015 Arkansas Weatherization Program, by measure. Total savings summarizes the savings calculations performed as per TRM V5.0 protocols for the AWP. As previously noted, the net-to-gross ratio for the 2015 program year is 1.

Table 2-13 Ex Post Net Savings by Measure Type – Overall

Measure	*Peak Demand Savings (kW)*	*Annual Savings (kWh)*	*Lifetime Savings (kWh)*	*Peak Demand Savings (Therms)*	*Annual Savings (Therms)*	*Lifetime Savings (Therms)*
Air Infiltration	42.63	93,953.88	1,033,492.63	470.42	15,608.29	171,691.19
Ceiling Insulation	44.86	66,225.09	1,324,501.86	78.29	4,548.53	90,970.65
Central AC Replacement	4.19	4,351.15	82,671.92	-	-	-
Direct Vent Heater	-	-	-	17.73	1,161.06	14,678.90
Duct Sealing Installation	-	-	-	-	-	-
Floor Insulation	0.04	676.16	13,523.24	(0.09)	8.73	174.56
Gas Central Replacement	-	-	-	9.36	603.44	11,321.70
Heat Pump Replacement	0.55	2,875.80	46,012.78	-	-	-
Refrigerator Replacement	0.64	4,368.84	56,566.98	-	-	-
Residential Lighting	3.97	27,054.29	213,511.46	-	(0.31)	(2.35)
Smart Thermostat	-	7,043.15	77,474.61	-	397.11	4,368.21
Storm Windows	0.01	28.30	566.00	0.90	29.20	584.00
Wall Insulation	0.54	521.73	10,434.56	-	194.52	3,890.50
Water Heater Insulation	-	-	-	0.03	18.64	242.32
Water Heater Pipe Insulation	0.02	394.75	4,342.25	0.12	59.12	768.58
Window AC	0.77	637.73	6,696.16	-	-	-
Window Replacement	12.55	15,433.52	308,670.38	16.92	439.71	8,794.12
Total	110.78	223,564.39	3,178,464.84	593.67	23,068.05	307,482.37

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2.10 Ex Post Net Savings for Electric Utilities

The participating electric IOUs with homes achieving savings through the 2015 program were AEP-SWEPCO and EAI. Table 2-14 presents the *ex post* net savings results of the evaluation of the 2015 AWP for electric utilities.

Table 2-14 Ex Post Net Savings by Electric Utility

Electric Utility	*# of Homes*	*Peak Demand Savings (kW)*	*Annual Savings (kWh)*	*Lifetime Savings (kWh)*
AEP-SWEPCO	13	23.12	43,922.09	693,639.06
EAI	68	69.30	155,489.33	2,146,105.97
OG&E	0	-	-	-
Non-IOU	13	18.37	24,152.96	338,719.81
Total	94	110.78	223,564.39	3,178,464.84

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Table 2-15 and Table 2-16 summarize the *ex post* net savings and net realization rates by measure for the two electric IOUs that had participating homes during 2015.

Table 2-15 Ex Post Net Savings by Measure Type – AEP – SWEPCO

Measure	*Peak Demand Savings (kW)*	*Annual Savings (kWh)*	*Lifetime Savings (kWh)*	*kWh Realization Rate*	*kW Realization Rate*
Air Infiltration	6.44	11,863.45	130,497.93	100%	100%
Ceiling Insulation	10.51	17,748.29	354,965.83	101%	148%
Central AC Replacement	1.68	1,804.85	34,292.08	77%	182%
Direct Vent Heater	-	-	-		-
Duct Sealing Installation	-	-	-		-
Floor Insulation	-	-	-		-
Gas Central Replacement	-	-	-		-
Heat Pump Replacement	0.21	1,038.73	16,619.74	49%	52%
Refrigerator Replacement	0.07	477.38	6,016.73	148%	148%
Residential Lighting	0.67	4,272.31	32,751.01	109%	115%
Smart Thermostat	-	1,684.76	18,532.32	1755%	-
Storm Windows	-	-	-		-
Wall Insulation	-	-	-		-
Water Heater Insulation	-	-	-		-
Water Heater Pipe Insulation	0.00	75.91	835.05	100%	102%
Window AC	-	-	-		-
Window Replacement	3.53	4,956.42	99,128.37	100%	100%
Total	23.12	43,922.09	693,639.06	101%	121%

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Table 2-16 Ex Post Net Savings by Measure Type – EAI

Measure	*Peak Demand Savings (kW)*	*Annual Savings (kWh)*	*Lifetime Savings (kWh)*	*kWh Realization Rate*	*kW Realization Rate*
Air Infiltration	28.06	72,113.45	793,247.98	100%	101%
Ceiling Insulation	27.27	42,359.52	847,190.31	101%	146%
Central AC Replacement	1.68	1,643.88	31,233.81	62%	138%
Direct Vent Heater	-	-	-		-
Duct Sealing Installation	-	-	-		-
Floor Insulation	0.04	676.16	13,523.24	75%	68%
Gas Central Replacement	-	-	-		-
Heat Pump Replacement	0.35	1,837.07	29,393.04	49%	52%
Refrigerator Replacement	0.55	3,802.21	43,298.02	194%	194%
Residential Lighting	2.58	18,269.85	143,099.52	110%	117%
Smart Thermostat	-	4,655.24	51,207.64	2293%	-
Storm Windows	0.00	13.00	260.00	100%	578%
Wall Insulation	0.54	521.73	10,434.56	104%	131%
Water Heater Insulation	-	-	-	0%	0%
Water Heater Pipe Insulation	0.01	296.46	3,261.11	94%	97%
Window AC	0.77	637.73	6,696.16	148%	100%
Window Replacement	7.44	8,663.03	173,260.58	100%	100%
Total	69.30	155,489.33	2,146,105.97	104%	116%

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Table 2-17 presents the electric savings that were not associated with any AWP IOU. These savings are attributable to municipal utilities, co-op utilities, or other energy providers. Thus, the savings are not attributed to any specific program sponsoring utility.

Table 2-17 Ex Post Net Savings by Measure Type – Non-IOU (Electric)

Measure	*Peak Demand Savings (kW)*	*Annual Savings (kWh)*	*Lifetime Savings (kWh)*	*kWh Realization Rate*	*kW Realization Rate*
Air Infiltration	8.13	9,976.98	109,746.73	100%	100%
Ceiling Insulation	7.08	6,117.29	122,345.72	102%	161%
Central AC Replacement	0.84	902.42	17,146.04	77%	182%
Direct Vent Heater	-	-	-		-
Duct Sealing Installation	-	-	-		-
Floor Insulation	-	-	-		-
Gas Central Replacement	-	-	-		-
Heat Pump Replacement	-	-	-		-
Refrigerator Replacement	0.01	89.26	7,252.23	53%	53%
Residential Lighting	0.72	4,512.13	37,660.93	109%	125%
Smart Thermostat	-	703.15	7,734.65	1005%	-
Storm Windows	0.01	15.30	306.00	100%	94%
Wall Insulation	-	-	-		-
Water Heater Insulation	-	-	-		-
Water Heater Pipe Insulation	0.00	22.37	246.09	100%	109%
Window AC	-	-	-		-
Window Replacement	1.58	1,814.07	36,281.42	100%	100%
Total	18.37	24,152.96	338,719.81	103%	121%

2.11 Ex Post Net Savings for Gas Utilities

The only gas IOU with participating homes during 2015 was CenterPoint. Table 2-18 presents the savings results of the evaluation of the 2015 AWP for CenterPoint and for non-IOU sources. Table 2-19 summarizes the *ex post* net savings and net realization rate by measure for CenterPoint.

Table 2-18 Ex Post Net Savings by Gas Utility

Gas Utility	*# of Homes*	*Peak Demand Savings (Therms)*	*Annual Savings (Therms)*	*Lifetime Savings (Therms)*
AOG	0	-	-	-
CenterPoint	76	554.85	21,461.16	283,903.33
Black Hills	0	-	-	-
Non-IOU	18	38.82	1,606.89	23,579.04
Total	94	593.67	23,068.05	307,482.37

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Table 2-19 Ex Post Net Savings by Measure Type – CenterPoint

Measure	*Peak Demand Savings (Therms)*	*Annual Savings (Therms)*	*Lifetime Savings (Therms)*	*Therms Realization Rate*	*Peak Therms Realization Rate*
Air Infiltration	444.52	14,721.36	161,935.00	100%	100%
Ceiling Insulation	68.53	3,988.73	79,774.60	102%	102%
Central AC Replacement	-	-	-		-
Direct Vent Heater	15.94	1,047.07	12,950.95	163%	163%
Duct Sealing Installation	-	-	-		-
Floor Insulation	(0.09)	8.73	174.56	100%	-
Gas Central Replacement	9.36	603.44	11,321.70	107%	108%
Heat Pump Replacement	-	-	-		-
Refrigerator Replacement	-	-	-		-
Residential Lighting	-	(0.28)	(2.13)	230%	-
Smart Thermostat	-	397.11	4,368.21	175%	-
Storm Windows	0.90	26.30	526.00	100%	146%
Wall Insulation	-	194.52	3,890.50	107%	0%
Water Heater Insulation	0.03	18.64	242.32	100%	100%
Water Heater Pipe Insulation	0.11	55.59	722.63	100%	102%
Window AC	-	-	-		-
Window Replacement	15.54	399.95	7,999.00	100%	100%
Total	554.85	21,461.16	283,903.33	104%	101%

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Table 2-20 presents the *ex post* net gas savings that were not associated with any AWP IOU. The "Non-IOU" *ex post* savings may represent propane customers or other types of customers that do not receive gas service from an IOU.

Table 2-20 Ex Post Net Savings by Measure Type – Non-IOU (Gas)

Measure	*Peak Demand Savings (Therms)*	*Annual Savings (Therms)*	*Lifetime Savings (Therms)*	*Therms Realization Rate*	*Peak Therms Realization Rate*
Air Infiltration	25.90	886.93	9,756.19	100%	100%
Ceiling Insulation	9.76	559.80	11,196.05	100%	100%
Central AC Replacement	-	-	-		-
Direct Vent Heater	1.78	114.00	1,727.96	152%	154%
Duct Sealing Installation	-	-	-		-
Floor Insulation	-	-	-		-
Gas Central Replacement	-	-	-		-
Heat Pump Replacement	-	-	-		-
Refrigerator Replacement	-	-	-		-
Residential Lighting	-	(0.03)	(0.22)	233%	-
Smart Thermostat	-	-	-	0%	-
Storm Windows	-	2.90	58.00	100%	-
Wall Insulation	-	-	-		-
Water Heater Insulation	-	-	-		-
Water Heater Pipe Insulation	0.01	3.53	45.95	100%	101%
Window AC	-	-	-		-
Window Replacement	1.38	39.76	795.12	100%	100%
Total	38.82	1,606.89	23,579.04	97%	102%

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3. Process Evaluation Findings

This chapter presents the key findings from the limited process evaluation that the Evaluators conducted in 2015. This includes a status assessment of recommendations from prior program evaluations and a summary of updates to program operation and delivery. Additionally, the chapter presents findings from in-depth interviews with program staff, provides a review of customer surveys conducted by the participating community action agencies, and addresses the checklist factors for portfolio comprehensiveness.

3.1 Process Evaluation Considerations

The Evaluators conducted a formal process evaluation of the AWP in 2012 and conducted limited process evaluations in 2013 and 2014. These process evaluation efforts resulted in several recommendations and identified program strengths and weaknesses, as well as existing opportunities. TRM V5.0 Protocol C addresses the criteria used to determine the timing and conditions needed for a process evaluation, and the following tables summarize the AWP in the context of these requirements.

Table 3-1 Determining Process Evaluation Timing

Component	*Determination*
New and Innovative Components	No. The overall program design has not been significantly modified in recent years.
No Previous Process Evaluation	No. A full process evaluation was conducted in 2012, and limited process evaluations were conducted in 2011, 2013, and 2014.
New Vendor or Contractor	Yes. The program continued to be funded by the Arkansas IOUs and implemented by the Arkansas community action agencies and their contractor, but the program administrator is now one of the agencies (CADC) rather than ACAAA.

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Table 3-2 Determining Process Evaluation Conditions

Component	*Determination*
Are program impacts lower or slower than expected?	Yes. Program activity has decreased over time and the program did not meet its savings goals for any of the IOUs in 2015.
Are the educational or informational goals not meeting program goals?	No. Program awareness is sufficient and participants have reported substantial increases in energy efficiency and home maintenance awareness.
Are the participation rates lower or slower than expected?	Yes. Program activity has decreased over time, and the program did not meet its savings goals for any of the IOUs in 2015.
Are the program's operational or management structure slow to get up and running or not meeting program administrative needs?	Yes. The community action agencies have struggled to expend utility funds towards weatherization projects.
Is the program's cost-effectiveness less than expected?	Cost-effectiveness scores for the program vary significantly by IOU.
Do participants report problems with the programs or low rates of satisfaction?	No. Participants in past years reported very high levels of satisfaction with their participation and with the quality of work performed.
Is the program producing the intended market effects?	Possibly. Overall weatherization activity, including development of additional weatherization programs, has increased since the initiation of the AWP, although attribution to the AWP has not been formally established.

As 2015 marks the final year of operation for the AWP before the IOUs begin implementing weatherization services under the Consistent Weatherization Approach framework, a full process evaluation is not needed. Instead, the Evaluators conducted a limited process evaluation focusing on the program's response to prior recommendations, current participant feedback and satisfaction, and identifying issues that may be relevant to the agencies or IOUs moving forward.

In order to address these areas, the Evaluators conducted the following research tasks:

- Tracking database and documentation review;
- Interviews with program staff; and
- Participant surveys.

Additionally, the Evaluators gained insight into savings performance through the impact evaluation. Results from the TRM verification provided insight into *ex ante* vs. *ex post* savings discrepancies and overall measure savings estimates.

Table 3-3 below summarizes the survey and interview data collection for the process evaluation activities, including data collection type, number of respondents, and additional details. The Evaluators invited staff from each of the seven sponsoring IOUs to participate in in-depth interviews for the 2015 program evaluation. This request was ultimately accepted by staff representing four of the IOUs. Additionally the Evaluators discussed the

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program with CADC staff during the 2015 program year, but CADC did not respond to requests for a formal in-depth interview.

Table 3-3 Interview and Survey Data Collection Summary

Component	*Activity*	*N*	*Details*
AOG Program Manager and Staff	Interview	1	The program manager and operational staff are responsible for managing reimbursements to local agencies, planning for overall program activity and savings expectations, and communicating with agency and ACAAA staff as necessary throughout the program year.
OG&E Program Manager and Staff	Interview	1	
SWEPCO Program Manager	Interview	1	
EAI Program Manager	Interview	1	
CADC Staff	Mid-year Discussion	1	CADC serves as the lead community action agency and coordinates program implementation, quality assurance, and data reporting processes.
Participating Customers	Surveys	24	Participating residential utility customers received weatherization services through the program in 2015.

3.2 Response to Program Recommendations

Table 3-4 summarizes the status of issues and recommendations identified in the 2014 process evaluation and impact evaluation of the Arkansas Weatherization Program. Some issues such as tracking data errors have been addressed, but several of the issues have persisted through the 2015 program year.

Table 3-4 Status of Recommendations from 2014 Program Year

Issue	Consequences	Recommendation	Program Response	Status of Issue
Many AWP operational and performance issues are related to WAP operations and WAP requirements for community action agencies.	Restricts agency participation in AWP May create inconsistencies in data collection, leading to potential errors for the AWP	CADC should continue to make efforts to work with the AEO in developing a mutually beneficial working relationship, and maintain consistency between the two programs where feasible.	There does not appear to have been an improvement in agency activity or improved cooperation between WAP and AWP mechanisms.	Persists
There were minor tracking data errors such as missing *ex ante* savings, calculation errors, and other missing fields in some cases.	Potentially lost savings Skewed measure-level realization rates	Resolve these tracking data issues for the 2015 program year.	Most tracking issues have been resolved, only minor issues remain	Resolved
Some utilities provide or link to program documents that are out-of-date. Most of the participating agencies do not discuss the AWP on their websites, and frame weatherization as an income-qualified service.	Customers may gain inaccurate information regarding service providers and other details. May reduce program interest from private co-pay customers.	The utilities should review their website materials and provide links to updated program documentation if possible. The agencies should provide information regarding the AWP on their websites, and explain that the program does not have an income level requirement.	No longer relevant for most utilities, and AWP marketing has ceased due to program ending after 2015.	Reviewed and Rejected/No Longer Applicable
Some data are not available due to being only in hardcopy form or decentralized from the CADC.	Potential lost data Potential delays in data transfer if additional data are needed	Agencies should maintain electronic records of all collected audit, implementation, and verification data.	Sufficient electronic data exist to satisfy TRM requirements, but some data remain in hard copy only	Partially Addressed

Issue	Consequences	Recommendation	Program Response	Status of Issue
Periodic program activity updates to the utilities do not include measure level cost data or measure counts.	Limits utility ability to plan for annual reporting Limits utility awareness of program performance	Include more details in the periodic reports that are sent to utilities, including measure counts/descriptions, customer names, etc.	The level of detail in monthly and quarterly reports to the utilities from CADC and other agencies has not increased. Measure counts and specific participant information have not been included.	Persists
The reported air infiltration leakage rates appear skewed downward, based on the Evaluators' site visits.	Possible issues with measure implementation or data collection Possible discrepancies between implementation and verification that will lead to skewed realization rates.	1: Include itemized air infiltration measures in the tracking data so that the Evaluators are able to verify individual measure elements 2: Include any field notes related to the blower door test in the tracking data so that the Evaluators may more accurately recreate the testing conditions 3: Discuss air infiltration testing procedures with the Evaluators in order to ensure that the testing methodologies are consistent among agencies, their contractors, and the Evaluators.	There has been no change in the level of detail of air infiltration measures, and no clarification of methodologies	Persists

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3.3 Program Structure Overview

Program design and structure in 2015 remained fairly consistent with the 2014 program year. The following provides a review of program design characteristics and operational procedures, noting any specific updates for 2015.

The primary change for the 2015 program year was that administration of the program, including coordination of implementation activity and allocation of funding to participating agencies, transitioned to the Central Arkansas Development Council (CADC) from the Arkansas Community Action Agencies Association (ACAAA). As CADC had already been closely involved in program implementation and coordination of agencies in prior years, the effects of this transition were fairly minimal.

In 2015, the Arkansas Weatherization Program (AWP) provided residential energy audits and energy efficiency measure installations to homes whose residents are customers of one or more of the following investor owned utilities (IOUs):

- American Electric Power – Southwestern Electric Power Company (AEP-SWEPCO);
- Entergy Arkansas, Inc. (EAI); and
- CenterPoint Energy (CenterPoint).

The following IOUs are sponsoring utilities for the AWP and have achieved savings through the program in past years but did not have any customers participate in the program during 2015:

- Empire District Electric Company (EDEC).
- Oklahoma Gas and Electric (OG&E);
- Black Hills Energy; and
- Arkansas Oklahoma Gas Corporation (AOG).

The program is offered in conjunction with the Department of Energy (DOE) Weatherization Assistance Program (WAP), which provides federal assistance to fund the customer co-payment in the AWP for income-qualified households. In Arkansas, the WAP is administered by the Arkansas Energy Office (AEO). If the customer meets the eligibility requirements of the WAP, the weatherization project can be funded by both the WAP and the AWP in order to fully cover the project cost and eliminate the cost to the

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customer.[9] Customers who are not eligible for the WAP are required to provide their own co-pay in order to participate in the AWP and receive the audit and associated measures.

Rather than an income requirement, eligibility for the AWP is based on a set of criteria regarding customer residence energy efficiency. In order to qualify, customer homes must meet specific criteria indicating that the residence is severely energy-inefficient. There were no modifications to these criteria for the 2015 program year.

Local community action agencies work with customers to enroll in the program and determine AWP and WAP eligibility. In 2015, qualifying AWP projects were completed by the following agencies:

- Central Arkansas Development Council (CADC);
- Crowley's Ridge Development Council (CRDC); and
- Pine Bluff Jefferson County Economic Opportunities Commission, Inc. (PBJCEOC).

After the customer is approved and the in-home audit is performed, optimal energy efficiency measures for AWP (and WAP, for eligible customers) are identified through the use of National Energy Audit Tool (NEAT) or Mobile Home Energy Audit (MHEA) software. The measures implemented in participating homes during 2015 include:

- Ceiling, floor and wall insulation;
- Air infiltration reduction;
- Window replacement and storm window installation;
- Heating and air conditioning replacement;
- Water heater insulation jackets and pipe wrap;
- Refrigerator replacement;
- CFL retrofits; and
- Smart thermostats.[10]

The local agencies conduct onsite audits and install the necessary measures using their internal crews or subcontractors. Audit and installation crews record all relevant measure input data and report it to the Central Arkansas Development Council (CADC), who

[9] Eligibility for the Weatherization Assistance Program (WAP) is based on income thresholds, which increase with the number of residents in the home. A description of the WAP, along with the associated income requirements, can be found here: http://www.benefits.gov/benefits/benefit-details/1843.

[10] A complete list of all eligible program measures can be found in ACAAA Docket no. 07-079-TF, Attachment A (AWP Modified Program Design and Description).

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aggregates the information from each agency. Batches of data are then sent to Frontier Associates, the program database provider that manages the EnerTrek software tool. EnerTrek incorporates the onsite data into TRM savings formulas (and NEAT/MHEA values for measures not included in the TRM) to calculate *ex ante* savings for each measure. The resulting savings are made accessible to program utilities and EM&V contractors, who use EnerTrek database exports to conduct measure implementation and savings verification activities.

Table 3-5 identifies core program stages and includes key activities performed throughout the program process. The activities and stages shown for 2015 are fairly consistent with those of 2014 and prior years, with modifications to include additional details and clarifications regarding program procedures, and to reflect CADC's role as the program administrator.

Table 3-5 Key Activities and Program Stages, 2015 Program Year

Program Stage	*Key Activities*
Program Design Planning	• Utilities set budgets and savings goals for the program year. • Frontier Associates and the participating agencies make any necessary modifications to data collection procedures or program delivery based on TRM changes or other program design changes. • Agencies plan their program activity based on expected WAP funding levels and planned AWP funding.
Training and Implementation Planning	• Community action agencies, contractors, and other program operations staff attend program-relevant training sessions (primarily for new contractor staff) • CADC and local agencies discuss implementation and program updates (primarily to comply with TRM changes).
Program Promotion	• Agencies market the program to local customers who may provide a private co-pay. • Agencies enroll customers from the WAP wait list. • Utilities answer customer inquiries about the AWP or refer customers to their respective agencies.
Program Participation	• Customers apply for the AWP and home eligibility is determined. • WAP eligibility is determined. • Participants receive in-home audits and measures are identified.
	• Contractors install measures that are either stipulated based on NEAT or MHEA software or are agreed upon with the customer (depending on whether or not WAP funds are used for the co-pay).
Data Processing and Monitoring	• Measure costs and participant tracking data are collected by each agency and reported to CADC. • CADC provides periodic cost and participation updates to the utilities. • Frontier Associates receives implementation data from CADC and calculates *ex ante* savings • Frontier Associates sends savings data in batches to the utilities. • Utilities, CADC, and Frontier Associates have periodic discussions regarding program participation levels and other topics.

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Starting in 2016, the Arkansas IOUs will be implementing individual and joint weatherization programs that comply with the Consistent Weatherization Approach developed by the Arkansas Parties Working Collaboratively (PWC). The Consistent Weatherization Approach will replace the AWP as the statewide weatherization offering implemented by the Arkansas IOUs, and thus the 2015 program year marks the final year of operation for the AWP.

3.4 Arkansas Weatherization Program 2015 Participation

In 2015, the Arkansas Weatherization Program conducted energy audits and installed measures in 94 homes. This is a substantial reduction in participation from each of the prior program years (168 homes serviced in 2014, 291 in 2013, 641 in 2012, and 810 in 2011).

Table 3-6 displays total participation disaggregated by the community action agency associated with the participant. As with prior years, CADC was the most active agency within the program, completing 73% of projects (CADC completed 76% of AWP projects during the 2014 program year).

Table 3-6 Total Participation by Community Action Agency

Agency Name	*Percentage of Participating Homes*
Central Arkansas Development Council (CADC)	73%
Crowley's Ridge Development Council (CRDC)	11%
Pine Bluff-Jefferson County Economic Opportunities Commission (PBJCEOC)	16%
N	94

The AWP is offered in all investor-owned utility service territories and is funded by participating gas utilities and electric utilities throughout Arkansas. Depending on the location of customers and the fuel sources used in their homes, services for each customer are funded by one gas utility, one electric utility, or both a gas and an electric utility. EAI and SWEPCO were the only electric IOUs with participating homes during 2015, and CenterPoint was the only gas IOU with participating homes. Table 3-7 cross-tabulates participation by the gas and/or electric utility associated with the participant. “N/A” represents projects performed in homes with only one utility source or with a utility service provider that is not part of the AWP.

Table 3-7 Participation by Associated Utility, 2015

Electric Utility	Gas Utility	
	CenterPoint	*N/A*
EAI	54	14
SWEPCO	9	4
N/A	13	-

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Figure 3-1 displays a comparison between 2015 and 2013 in terms of participation rates by month, based on the installation date included in program tracking data.[11] The number of weatherization projects per month in 2015 was lower than 2014 for all months other than February and December. The most active month of 2015 was February, with 16 participants.

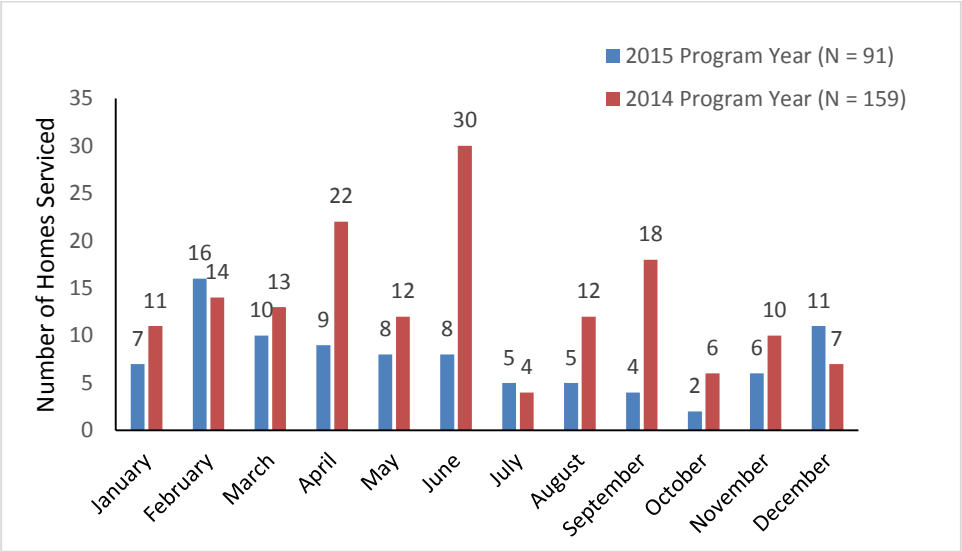

Figure 3-1 Participation Rates by Month, 2015 vs. 2014

3.5 Participant Survey Results

This section highlights key findings from participant surveys for the 2015 program year of the Arkansas Weatherization Program (AWP). The surveys were administered individually to program participants over the phone, and each program participant was given the same survey. The survey primarily focused on participants' satisfaction with the program and the perceived benefits of participating. A similar participant survey was administered as part of the 2012 AWP evaluation, and these results from 2015 may be used to compare participant satisfaction with the program over time. In total, 24 program participants responded to the survey.

The data collected from this survey provides insight into participants' overall program experience, specifically addressing:

- Customer motivations and awareness of the program;
- Customer familiarity with energy efficiency;
- Customer satisfaction; and
- Customer characteristics.

[11] The installation date was not listed for three participants.

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This section highlights key findings related to the above categories, and draws comparisons between the results from the 2012 program evaluation and the current evaluation where appropriate.

3.5.1 Participant Removal of Measures

In order to assess whether the measures reported in program tracking data were still installed at the time of the survey, respondents were asked whether they had removed or replaced any of the equipment or energy efficiency improvements that had been installed through the program. Only one respondent initially indicated that they had removed a measure, stating that they had replaced their new windows with old windows. However, the Evaluators conducted a follow up call with this respondent and found that this had been a miscommunicated response and that the customer had not actually removed any of their measures. Thus, the survey found a measure removal rate of 0% among the participant survey sample.

3.5.2 Participant Motivations and Familiarity with Energy Efficiency

This section details findings related to how participants learned about the Arkansas Weatherization Program and discovering the extent of their prior experience with energy efficiency practices. Table 3-8 illustrates that the majority of participants (54%) heard about the program from friends, family, or other personal acquaintances. This was also the top result for this question during the 2012 evaluation, and suggests that the program has continued to receive positive word-of-mouth marketing within the customer base. Only three respondents (13%) stated that they learned of the program through their local agency, and only two respondents indicated learning of the program online.

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Table 3-8 How Participants Learned of the Program

	Response	*Percentage of Respondents (N = 24)*
How did you learn of the Arkansas Weatherization Program?	Information that came in the mail	8%
	Newspaper or magazine article/ad	4%
	Contractor	0%
	Word of mouth from friends, relatives, or others	54%
	TV ad	0%
	Radio ad	0%
	Utility bill message	0%
	Utility website	8%
	Other website	0%
	Local community action agency	13%
	Other	13%
	Don't know	4%

Respondents were able to provide more than one response for this question. Percentages displayed are percentages of respondents rather than percentages of responses. Therefore, the total exceeds 100%.

Participants were then asked about their reasons for participating, and the results are shown in Table 3-9. Although respondents were provided with a list of response options, the majority of respondents selected the option of “Other” and provided an open-ended response indicating that they participated in the program because their home needed specific improvements. These improvements included insulation, making the house warmer, replacing the air conditioning unit, and reducing air leakage. Among the remaining listed response options, respondents most commonly selected “to reduce my monthly electric bill” or “to reduce my monthly gas bill”. Reduction of utility bills was the most common reason for participating found during the 2012 evaluation.

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Table 3-9 Reasons for Participation

	Response	*Percentage of Respondents (N = 24)*
What is the main reason you decided to participate in the program?	To reduce my monthly electric bill	17%
	To reduce my monthly gas bill	21%
	Save energy	13%
	AWP paid for some or all of the improvements	13%
	Recommendation from a friend, relative, neighbor	8%
	[The house needed specific improvements]	54%
	Help save the environment	0%
	Contractor recommendation	0%
	Community Action Agency Recommended	0%
	Other	8%
	It is the right thing to do	0%

Respondents were able to provide more than one response for this question. Percentages displayed are percentages of respondents rather than percentages of responses. Therefore, the total exceeds 100%.

In order to further understand participants' reasons for participating in the AWP, the survey asked a series of questions relating to their understanding of the concept of energy efficiency prior to participation in the program. For these questions, participants responded on a scale of 1 to 5, where "5" is very familiar, "1" is very unfamiliar, and "3" is neutral, i.e. neither familiar or unfamiliar.

The findings suggest that the majority of participants consider themselves to have had some familiarity with energy efficiency prior to the start of the program. Table 3-10 shows that the majority of respondents (63%) stated that they were at least somewhat familiar with the installation of various energy efficiency home improvements while Table 3-11 shows that three-quarters of respondents considered themselves to be at least somewhat familiar with various household energy saving activities, such as washing clothes with cold water, changing light bulbs, and adjusting heating systems. These results are similar to those found during the 2012 evaluation.[12] As with the 2012 program year, a greater percentage of respondents reported being familiar with energy saving activities rather than energy saving purchases, which may suggest that these customers are more likely to take no-cost or low-cost actions when attempting to reduce their energy consumption.

[12] During the 2012 survey, 52% of respondents stated that they were at least somewhat familiar with energy efficiency improvements, and 67% stated that they were at least somewhat familiar with energy saving behaviors.

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Table 3-10 Participants' Past Familiarity with Energy Efficiency Improvements

	Response	*Percentage of Respondents (N = 24)*
Prior to the audit, how familiar were you with the benefits of installing various energy efficiency improvements similar to those offered by the Arkansas Weatherization Program?	Very Familiar	21%
	Somewhat Familiar	42%
	Neither Familiar or Unfamiliar	0%
	Somewhat Unfamiliar	12%
	Very Unfamiliar	17%
	Don't Know	8%

Table 3-11 Participants' Familiarity with Energy Savings Activities

	Response	*Percentage of Respondents (N = 24)*
Prior to the audit, how familiar were you with various household energy saving *activities* such as washing with cold water, reducing your use of light fixtures, and adjusting heating system settings?	Very Familiar	33%
	Somewhat Familiar	42%
	Neither Familiar or Unfamiliar	0%
	Somewhat Unfamiliar	17%
	Very Unfamiliar	0%
	Don't Know	8%

Following this, respondents were asked whether they are now more knowledgeable about energy efficiency than they were before participating in the program. As shown in Table 3-12, approximately two-thirds (67%) of respondents indicated that they are now much more knowledgeable than they were before participating in the program. Only two respondents (8%) stated that they are no more knowledgeable about energy efficiency and energy efficient options than they were previously. These results suggest that although participants considered themselves to be fairly knowledgeable about energy efficiency before participating in the AWP, they also credit the AWP with further increasing this level of knowledge.

Table 3-12 Increase in Energy Efficiency Knowledge Following AWP

	Response	*Percentage of Respondents (N = 24)*
As a result of your experience with the AWP, would you say you are more knowledgeable about energy efficiency and energy efficient options for your home?	Yes, much more knowledgeable than before participating	67%
	Yes, somewhat more knowledgeable than before participating	13%
	Yes, slightly more knowledgeable than before participating	8%
	No, not more knowledgeable than before participating	8%
	Don't Know	4%

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3.5.3 Participant Perspectives on Energy Efficiency

Upon establishing a baseline of understanding about participants' familiarity with energy efficiency, the survey asked participants about their previous, current and potential future involvement with implementation of energy efficiency improvements in their homes. Table 3-13 shows that 46% of respondents claimed to be performing energy-saving activities, which is a similar percentage to that found during the 2012 evaluation.[13] Respondents who reported that they had previously performed energy saving activities were asked to identify these activities, with common responses including turning off lights, washing with cold water, and turning down the thermostat.

Table 3-13 Participants' Prior Energy Saving Activities

	Response	*Percentage of Respondents (N = 24)*
Prior to the audit, did you perform any common household energy saving activities?	Yes	46%
	No	42%
	Don't Know	12%

Participants were then asked whether they now take additional energy saving actions in their home as a result of participating in the program. As shown in Table 3-14, 88% of program participants stated that they now do this. When asked to elaborate on these activities, participants primarily cited common, no-cost improvements such as washing with cold water, turning down the thermostat, and turning off lights when not in use. The majority of these respondents (53%) reported implementing more than one energy saving action in their home.

Table 3-14 Participants' Current Energy Saving Activities

	Response	*Percentage of Respondents (N = 24)*
As a result of your experience with the program, do you now take additional action to save energy in your home?	Yes	88%
	No	12%
	Don't Know	0%

3.5.4 Participant Satisfaction

This section presents the findings from survey questions geared toward understanding participants' satisfaction with the program. Participants were asked about various elements of the program's functioning; the results can be found in Table 3-15. These elements include the information provided by the agency, the quality of installation work,

[13] During the 2012 survey, 54% of respondents indicated that they had performed energy saving activities prior to participating in the program.

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the performance of the equipment installed, and the savings on utility bills. The vast majority of responses show that participants were very satisfied. Other than their overall program experience, respondents provided the most ratings of "very satisfied" for their improvement in home comfort.

Table 3-15 Participant Satisfaction with Selected Program Elements

Program Element	*Very satisfied*	*Somewhat satisfied*	*Neither satisfied nor dissatisfied*	*Somewhat dissatisfied*	*Very dissatisfied*	*Don't know*	*N*
Information provided by the community action agency	67%	21%	4%	4%	4%	0%	24
The quality of installation work by the contractor	63%	25%	4%	0%	4%	4%	24
The performance of the equipment installed	79%	13%	0%	0%	4%	4%	24
The savings on your monthly utility bills	67%	17%	8%	4%	0%	4%	24
The effort required for the application process	63%	21%	8%	0%	4%	4%	24
The wait-time to receive services	42%	21%	21%	0%	12%	4%	24
Information provided by utilities on how to reduce your utility bill	63%	25%	8%	0%	4%	0%	24
Improvement in home comfort	83%	13%	0%	4%	0%	0%	24
Usefulness of the energy audit	67%	17%	4%	0%	4%	8%	24
Overall program experience	88%	8%	0%	0%	4%	0%	24

As was the case with the 2012 program evaluation, the program element with the lowest average satisfaction was wait time. The three respondents who indicated that they were either somewhat or very dissatisfied with the wait time explained that they had waited either two or three years to receive services through the AWP. This is consistent with program staff comments during the current and prior evaluations, and suggests that wait times have not improved over the course of the program.

Overall, the results suggest that respondents are highly satisfied with each element of the program experience, with the exception of a few respondents. It should be noted that the majority of "somewhat dissatisfied" and "very dissatisfied" responses were provided by a single respondent, and only three respondents total indicated dissatisfaction with any program elements.

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When asked whether they would recommend the AWP to a friend or family member, all but one respondent (96%) stated that they would do this. The respondent who stated that they would not recommend the program did not provide a specific reason for this response other than stating that they "would have to think about it". This further suggests that participants are highly satisfied with the program overall, and that participant satisfaction levels have been maintained over the course of the program since 2012.

3.5.5 Participant Characteristics

This section presents the results from survey questions intended to provide insight into participant and home characteristics, including the age, square footage, heating type, and water heating type of participating homes. Additionally, respondents were asked about the number of bedrooms, bathrooms, showers, and total residents in their homes.

Table 3-16 Home Construction Dates

	Response	*Percentage of Respondents (N = 24)*
When was your home built?	Before 1970	58%
	1970's	13%
	1980's	13%
	1990-1994	0%
	1995-1999	0%
	2000-2005	0%
	Don't know	16%
	Refused	0%

Table 3-17 Approximate Square Footages of Participant Homes

	Response	*Percentage of Respondents (N = 24)*
What is the approximate square footage of your home?	Less than 1,000	17%
	1,001 - 1,500	17%
	1,501 - 2,000	4%
	2,001 - 2,500	4%
	Greater than 2,500	4%
	Don't know	50%
	Refused	4%

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Table 3-18 Number of Bedrooms in Participant Homes

	Response	*Percentage of Respondents (N = 24)*
How many bedrooms are there in your home?	1	4%
	2	50%
	3	38%
	4	8%
	Don't Know/Refused to Answer	0%

Table 3-19 Number of Bathrooms in Participant Homes

	Response	*Percentage of Respondents (N = 24)*
How many bathrooms are there in your home?	1	75%
	2	25%
	3	0%
	Don't Know/Refused	0%

Table 3-20 Number of Showers in Participant Homes

	Response	*Percentage of Respondents (N = 24)*
How many showers are there in your home?	0	4%
	1	75%
	2	21%
	3	0%
	Don't Know/Refused	0%

Table 3-21 Number of Residents in Home Year-Round

	Response	*Percentage of Respondents (N = 24)*
How many people live in your home year round, including yourself?	1	59%
	2	29%
	3	4%
	4	8%
	5	0%
	7	0%
	Don't Know/Refused	0%

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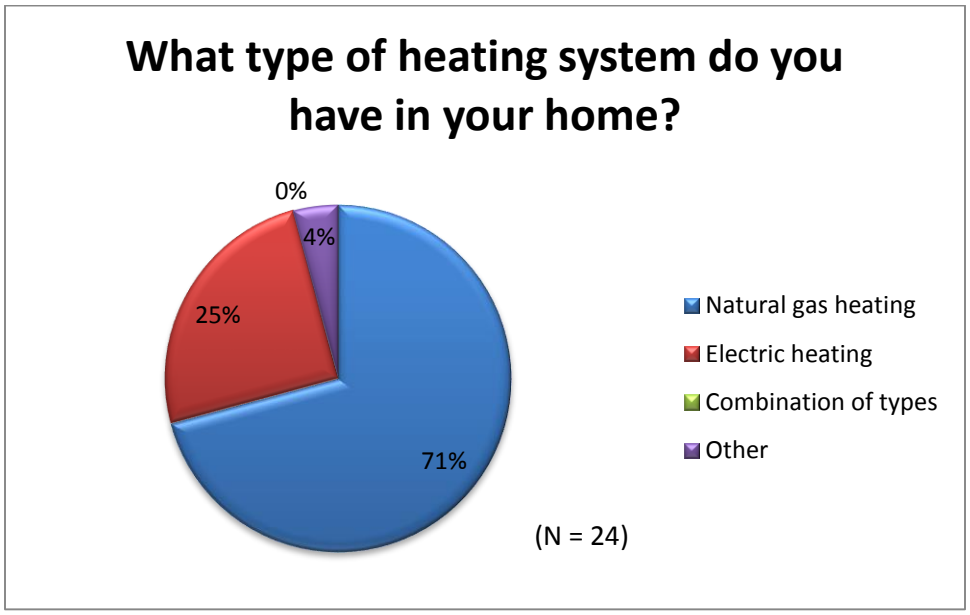

Figure 3-2 Types of Heating Systems in Participant Homes

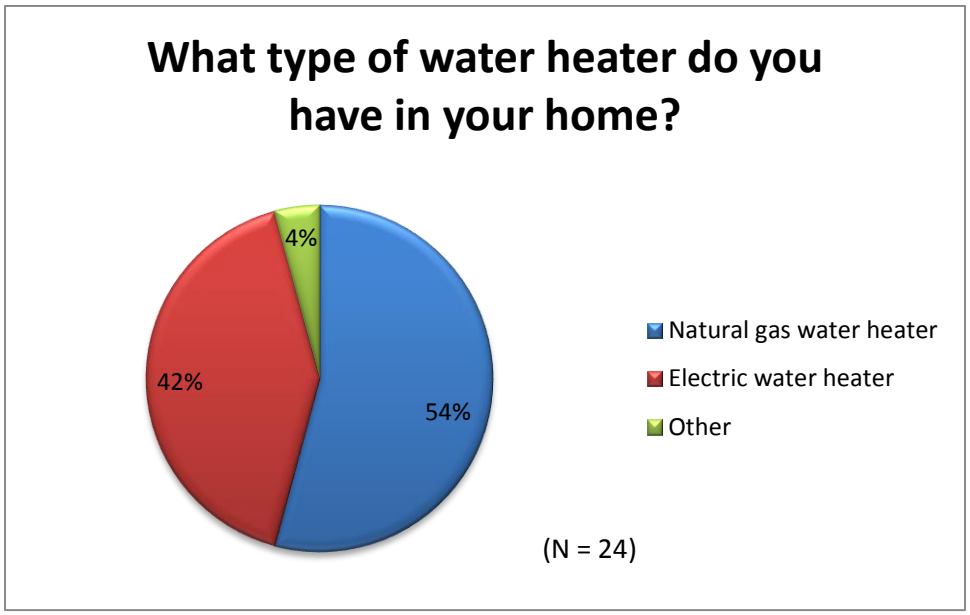

Figure 3-3 Types of Water Heaters in Participant Homes

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3.6 Program Staff Interviews

As part of the evaluation of the 2015 Arkansas Weatherization Program, the Evaluators conducted in-depth interviews with utility staff representing four of the participating IOUs. These interviews primarily served to assess the status of previous evaluation conclusions and recommendations, as well as to identify notable changes in program operation, delivery, and performance. As 2015 marks the final year of AWP operation before the Arkansas IOUs implement weatherization services as part of the Consistent Weatherization Approach framework, the interviews did not focus on further changes to the AWP but program staff provided feedback on the upcoming core framework.

This section presents key findings and issues identified through these interviews and through mid-year discussions with CADC staff.

3.6.1 Program Efficiency and Performance

Minimal Effects from CADC Transition: When asked about the transition from ACAAA to CADC as the program administrator, utility staff explained that the effects of this change have been minimal. One staff member noted that from their perspective, nothing about the operational structure had changed during the 2015 program year. Staff generally did not have much feedback regarding CADC's performance as the program administrator, but noted that CADC had continued to be the most active agency in performing weatherization for the program during 2015.

Continued Prioritization of WAP Funding: As with prior years staff acknowledged the challenges that have emerged and persisted due to the AWP's relationship with the Weatherization Assistance Program (WAP). The Arkansas Energy Office (AEO), which administers the WAP, has directed the agencies to follow a specific set of rules in order to comply with WAP procedures. The participating agencies have continually been directed to prioritize LIHEAP funding over AWP funding when implementing weatherization projects; remaining LIHEAP funds were set to expire on September 30th, 2015. This has continued to work as a barrier to the AWP and was not resolved during 2015.

Advancing Funds to the Agencies: CADC noted that some agencies have been unable to complete jobs through the AWP because they were concerned about being reimbursed for the work performed. As CADC typically provides funds to the agencies after the work is completed, some agencies preferred to conduct work under the WAP only. In order to address this, CADC staff requested that the utilities allow CADC to advance funds to the agencies. The purpose of this would be to provide the agencies with immediate funds that they could use to provide services, without having to rely on reimbursements from either the state or the AWP utilities. The utilities explored this possibility with CADC but ultimately it did not have any significant effects on agencies' ability to complete jobs under the AWP.

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Continued Program Decline: When asked about program performance in 2015 as compared with prior years, utility staff emphasized the fact that participation rates have steadily decreased during recent years and that very few significant program improvements had been made over time. Several utility staff members reported that their expectations for AWP performance were low or non-existent for 2015, and at least one utility received commission approval to move its funds away from the program in order to focus its other program offerings. Overall, utility staff noted that they have already shifted their focus to the Consistent Weatherization Approach, and stated that there seemed to be an overall lack of interest in the AWP on the part of program staff for 2015.

3.6.2 Data Quality and Availability

Minor Improvements in Data Accuracy: When asked about the quality of data provided to them in 2015, utility staff noted that the quality had either remained the same as 2014 or had only improved slightly. One utility staff member noted that there appeared to be fewer errors in the data during 2015 but that this could be due to the small participant population, as fewer errors would exist in a smaller data set. The level of detail in periodic reporting from CADC did not increase significantly, but one utility staff member noted that they did receive information about costs and the location of participant homes each month. Additionally, the utilities received periodic batches of *ex ante* measure-level savings data from Frontier throughout the year. Overall fewer data revisions and error corrections occurred during the 2015 program year.

3.6.3 Communication and Collaborative Efforts

Agency Roles in Upcoming Programs: Utility staff noted that as the Consistent Weatherization Approach framework allows the utilities to use community action agencies as audit and installation contractors, they may continue to work with the agencies moving forward. Two utility staff members explained that they have already begun recruiting the agencies into their weatherization programs. One staff member stated that they have reached out to six agencies and that one of the agencies has expressed interest in participating, while the other has had two agencies (Crawford Sebastian and CADC) attend their contractor kick-off meeting.

Consistent Weatherization Approach Development: When asked about communications surrounding the Consistent Weatherization Approach, utility staff stated that this process has been beneficial and that it has provided a mechanism by which the utilities are able to corroborate. Staff noted that the development of the Consistent Weatherization Approach framework has resulted in additional joint program partnerships and will hopefully lead to a more coordinated approach to weatherization.

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3.7 Tracking Database Review

As with prior years, Frontier Associates develops and maintains EnerTrek, the software tool that is used to store participant data and to calculate measure level savings based on collected inputs and TRM formulas. EnerTrek includes a full list of all participants, the measures that were installed in their homes, and the kWh and Therms savings associated with each measure.

During the 2015 program year, the Evaluators received periodic tracking data updates as well as final tracking exports.

The Evaluators previously reviewed program tracking data in 2014 in order to assess its compliance with Protocol A of TRM V5.0, which specifies that tracking data should be checked for:

- Participating Customer Information;
- Measure Specific Information;
- Vendor Specific Information;
- Program Tracking Information;
- Program Costs; and
- Marketing & Outreach Activities.

The Evaluators conducted a review of each of the above factors within the 2015 program tracking data with the exception of marketing and outreach activities as these are outside the scope of EnerTrek reporting.

Each of these factors was assessed individually based on the guidelines stated in TRM V5.0. Overall, the Evaluators conclude the following regarding tracking data completeness:

- The tracking data contained names, addresses, and contact information for all participants, and contained contact information for all but one participant. All participants were listed with a Job ID number. Additional participant information present in the tracking data included gas and electric utility provider designations and utility account numbers.
- All participant records included the name of the agency that implemented the weatherization services, and all but three records included the date of measure installation.
- The tracking data included project level costs for each home. The exports received by the Evaluators did not include measure-level costs.
- Premise characteristics such as home heating type, cooling type, construction date, baseline measurements, and attic square footage were present for all participants where necessary.

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3.8 Comprehensiveness Factors

The Arkansas Public Service Commission has in place a set of criteria in order to determine whether a DSM portfolio qualifies as "Comprehensive". This section provides updates to the review of the Arkansas Weatherization Program that was conducted by the Evaluators in prior years in relation to each factor.

As the AWP is one component of the larger utility energy efficiency program portfolios, a broader perspective is necessary in order to determine how well it is serving its intended role in those groups of programs. Utility annual reports and portfolio evaluations may present the AWP within the context of these broader energy efficiency portfolios. This section focuses on the comprehensiveness factors as they relate to the AWP on the program-level.

Additionally, as there were few changes to program design and operation during the 2015 program year, this review uses the prior comprehensiveness findings as a baseline and provides updates where appropriate.

- ***Factor 1:*** *Whether the programs and/or portfolio provide, either directly or through identification and coordination, the education,* ***training****, marketing, or outreach needed to address market barriers to the adoption of cost-effective energy efficiency measures;*
  - **Assessment of Education**

    The AWP has continued to implement educational efforts towards its prospective participants and other customers, although these efforts declined substantially during 2015. Educational efforts offered by the program have included:

    - Providing educational materials (energy audit, brochures, demonstrations)
    - Providing education targeted to specific market barriers (emphasizing increased comfort and safety levels as a benefit of energy efficiency)

    The program did not excel in the following components:

    - Providing outreach through multiple channels. A few agencies continued to promote the program but overall outreach declined substantially during 2015.
    - Providing coordinated education from multiple entities. Each agency and some utilities provide this, but based on interviews with agency and utility staff, the coordination could be improved substantially. Lack of coordination during 2015 is most likely attributable to the fact that several of the IOUs and agencies did not focus on the AWP as a major method of achieving energy savings.

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- **Assessment of Training**

  The active community action agencies have continued to participate in multiple training courses throughout the year. This includes training related to program updates and data requirements, as well as training that leads to residential audit and installation certifications. These courses maintain contractor skill levels and ensure that agency services comply with up-to-date audit and installation requirements. However, due to issues identified during the on-site verifications, it appears that there are significant opportunities to train some staff members on proper installation techniques and proper materials to use when performing this work.

- **Marketing and Outreach**

  Marketing for the program during 2015 was very minimal. Due to continual waiting list issues and the program ending after 2015, marketing was not a priority for the program and increased marketing may not have improved program performance.

  The program therefore did not excel in the following criteria:

  - Performed through several channels. Overall outreach declined substantially during 2015.
  - Promoted by trade allies (agencies and their contractors). Program promotion was minimal during 2015, with most agencies prioritizing the WAP over the AWP.
  - Address specific barriers. One major barrier to AWP participation has been that customers who are able to provide their own co-payment do not commonly participate. With minimal outreach conducted, this barrier persisted throughout 2015.

- ***Factor 2:*** *Budgetary, Management, and Program Delivery Resources*

  Although utility budget allocations to the AWP have historically been sufficient to fund the targeted number of homes, the AWP has continually experienced challenges in meeting program goals due to organizational and program delivery issues.

  As utilities began shifting their funds away from the AWP, the program was left with fewer operational resources. Additionally, funding issues within the WAP have constrained the AWP's participation potential and effectively reduced program resources.

- ***Factor 3:*** *Addressing Major End-Uses*

  The measure list available to the AWP did not change in 2015. The AWP offers a wide range of measures, which are chosen based on cost-effectiveness testing

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through NEAT and MHEA. The list of eligible program measures covers all major end-uses for targeted customer homes, including:

- HVAC systems;
- Equipment tune-ups;
- Hot water measures;
- Appliances (refrigerators);
- Safety measures (smoke detectors);
- Lighting; and
- Building envelope measures.[14]

The "whole house" approach to participant home improvements is conducive to providing a comprehensive set of measures in each home.

- ***Factor 4:*** *Comprehensively Addressing Customer Needs*

  The AWP is designed to comprehensively address the major needs of its participants by providing the following benefits:

  - Technical assistance through in-home audits;
  - Energy and monthly bill savings through measure installation; and
  - Increased comfort and/or safety for participants.

  Although the AWP is able to provide these benefits to customers who participate in the program, there remain a large number of utility customers who are in need of such services but whose participation has been delayed due to the program's operational issues.

  Participants who provide their own private co-pay for the audit and energy efficiency measures may choose to receive a less comprehensive set of services as they are allowed to select individual measures. These participants are encouraged to install the full set of recommended items, but comprehensiveness within measure installation is not required by the program in these cases.

- ***Factor 5:*** *Targeting Market Sectors & Leveraging Opportunities*

  The AWP focuses on a specific market of utility residential customers whose homes are severely energy inefficient. The AWP also involves utility partnerships and is intended to provide cross-fuel coordination rather than focusing only on gas or electric savings in isolation. This program is intended to amplify the benefits of the statewide Weatherization Assistance Program (WAP) in order to provide additional services to customers who have substantial weatherization needs.

[14] A complete list of eligible AWP measures can be found in program filing and planning documentation such as Attachment A, (AWP Modified Program Design and Description), of ACAAA Docket no. 07-079-TF.

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Thus, in theory, the program leverages WAP resources and is delivered through the same channels as the WAP.

- ***Factor 6:*** *Cost-Effectiveness of Energy Efficiency*

  There have been no significant improvements to program cost-effectiveness for 2015. Although the program is designed to cost-effectively generate net savings and meet the stated annual program goals, it has been unable to meet the annual goals thus far. Cost-effectiveness has varied widely among utilities in prior years. The AWP has successfully met industry standards for net-to-gross levels, as the Evaluators have determined that it calls for a net-to-gross ratio of 1. However, in terms of cost-effectiveness and savings goals, the AWP has not excelled.

- ***Factor 7:*** *Adequacy of EM&V Procedures*

  The AWP was reviewed for EM&V procedures in the following areas:

  - QA/QC and EM&V procedures conducted by utility staff;
  - QA/QC and EM&V procedures conducted by installation contractor staff; and
  - QA/QC and EM&V procedures conducted by the Evaluators.

  The onsite QA/QC procedures currently conducted by utility staff and agency staff are adequate in most cases. During onsite field verification visits during 2015, the Evaluators found that the reported installation data was fairly accurate and matched actual observed conditions for the majority of measures, but that there were significant quality of work issues with two homes. It is unclear whether this is an indication of systematic problems, but sufficient training and quality control should have identified or prevented these issues. The issues that were identified during these site visits are detailed in Section 2.6.

  Tracking data errors have been for the most part resolved in 2015, and the current version of the tracking database within EnerTrek contains the necessary information to comply with TRM V4.0 requirements.[15]

The Arkansas Weatherization Program meets several of the comprehensiveness requirements, but the program has struggled to achieve success and was not able to fully resolve any of its major operational issues during the past program cycle or recent bridge years. As previously noted, utility annual reports and other portfolio-level assessments may provide a more comprehensive view of how the AWP fits into the larger context of the sponsoring utilities' energy efficiency program portfolios.

[15] See Section 2.8 of this report for detailed information regarding the program tracking data review.

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4. Conclusions and Recommendations

After reviewing the Arkansas Weatherization Program for 2015, the Evaluators highlight the following conclusions:

Minimal Effects from CADC Transition: The transition from ACAAA to CADC as the program administrator does not appear to have mitigated the AWP's operational or performance issues. It appears that CADC made efforts to work with the AEO and increase agency involvement with the program, but any beneficial effects of these efforts were for the most part overshadowed by the program's decreased activity overall.

Quality of Work Issues: The Evaluators visited two participating homes that received weatherization services from PBJCEOC during 2015. The Evaluators identified issues with the quality of work performed, and one of the homeowners indicated that the agency contractors had chipped paint in their home and had not been considerate of the home in general. The Evaluators found that silver bubble wrap had been used as water heater tank insulation in one home and that water heater pipe wrap had been installed incorrectly in both homes. It is unclear whether these quality of work issues are limited to this agency or are indicative of a larger problem, and agency staff responded to the findings indicating that the silver bubble wrap is no longer being used and that the pipe wrap had been installed properly. However it may be beneficial to conduct further training with agency staff in order to ensure that they are complying with industry quality standards, and that they are providing adequate customer service to participants.

Minor Improvements in Data Accuracy: Tracking data errors have been for the most part resolved in 2015, and the current version of the tracking database within EnerTrek contains the necessary information to comply with TRM V4.0 requirements. Overall Frontier Associates has been very responsive to data requests and provided the utilities with fairly accurate batches of data throughout the program year. There were fewer tracking data issues in 2015 as compared to 2014.

Continued WAP Reliance Issues: As with prior years, program staff acknowledged the challenges that have emerged and persisted due to the AWP's relationship with the Weatherization Assistance Program (WAP). Ideally, this arrangement would use utility funds to efficiently leverage federal funding and substantially increase the number of weatherization projects that the agencies are able to perform. However, the AWP's inherent link to the WAP has continued to result in performance issues due to federal funding reductions. Additionally, the participating agencies were directed to prioritize LIHEAP funding over AWP funding when implementing weatherization projects, which is a key barrier to AWP program activity.

Decreasing Program Activity: The number of participants and the resulting savings levels for the AWP have steadily decreased since the 2011 program year. A major contributing factor to this decline in program activity is likely the fact that the program was

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winding down in 2015 and the IOUs were already focusing efforts on the Consistent Weatherization Approach. However other issues including variable agency engagement in weatherization services, inconsistent availability of WAP funding, and insufficient interest from private co-pay customers have historically limited the program's performance.

Upcoming Consistent Weatherization Approach: The new weatherization framework developed by the utilities and other stakeholders has established statewide weatherization procedures and services, and will be implemented beginning in 2016. Utility staff reported that they anticipate that this Consistent Weatherization Approach will be a more effective method of meeting the state's weatherization needs. Additionally, utility staff noted that the collaborative relationship among utilities has improved during the development of the new framework and that the core framework will hopefully lead to a more coordinated approach to weatherization in the state.

Although 2015 marks the final year of operation for the AWP as it currently stands, the Evaluators provide the following recommendations that the utilities or agencies may consider when moving forward with weatherization services under the Consistent Weatherization Approach framework:

Mitigate Quality of Work Issues: The quality of work issues identified by the Evaluators during on-site verifications during 2015 suggest that additional verification and training may be needed for contractors in the Pine Bluff region. Overall, the Evaluators suggest that additional quality assurance and training be conducted with any new contractors who are brought onto the IOUs' Consistent Weatherization Approach offerings.

Record and Report Air Infiltration Details: As with prior years, the Evaluators identified discrepancies between reported air infiltration leakage rates and verified air infiltration leakage rates. Although only nine homes received blower door testing as part of the 2015 evaluation, the majority of these homes showed verified infiltration rates that were higher than reported infiltration rates. Moving forward, the Evaluators recommend that the IOUs and contractors collect and report the itemized air infiltration measures that are installed. As it is very difficult to reliably replicate blower door results during a site visit, having this additional information will allow program staff or their EM&V contractors to verify that the work was performed properly.

Table 4-1 Recommendations from 2015 Program Year Evaluation

Issue	Consequences	Recommendation
The Evaluators identified significant issues with the quality of work in two homes during the on-site verification efforts	Some measures were not eligible for savings Negatively affects customer satisfaction	Contractors joining Consistent Weatherization Approach offerings, namely in the Pine Bluff area, should receive additional training and undergo quality control procedures that ensure sufficient customer service and installation of measures.
The reported air infiltration leakage rates appear skewed downward, based on the Evaluators' site visits.	Possible issues with measure implementation or data collection Possible discrepancies between implementation and verification that will lead to skewed realization rates.	Record and report itemized air infiltration measures in the tracking data so that it is possible to verify individual measure elements. Also, Include any field notes related to the blower door test in the tracking data so that testing conditions can be more accurately replicated.

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Appendix A: Participant Survey Instrument

Arkansas Weatherization Program

Participant Telephone Survey

ID No. _____

Customer Name: _____

Date of interview: _____

Date data entered _____

.....

Hello. May I please speak with [CONTACT NAME]: _____)?

Hello. My name is ___ and I'm calling from [Surveying Company Name] on behalf of the Arkansas gas and electric utilities about the Arkansas Weatherization Program your household participated in during 2015. Through this program your home received items such as attic insulation, air sealing, light bulbs, and other energy saving measures. Are you the person who is most familiar with your household's participation in this program?
(IF NOT RIGHT PERSON) May I please speak to the person who would know the most about your household's participation in this program?
REPEAT INTRODUCTION AND CONTINUE
(IF RIGHT PERSON) We are conducting a study to evaluate the Arkansas Weatherization Program, known as the AWP. AWP and community agency staff will use the results of this evaluation to determine the effectiveness of the program and to make improvements. We would like to include your opinions about the program in our evaluation. The interview will take approximately 10 minutes. May I ask you some questions about the work performed? Your responses will remain completely confidential.

Q-1 Our records indicate that you participated in the Arkansas Weatherization Program in 2015 by having an energy audit completed and receiving several energy efficient items installed in your home. Do you recall participating in this program?

- ❑ Yes [SKIP TO Q-4]
- ❑ No [GO TO Q-2]
- ❑ Don't know [GO TO Q-2]

Q-2 Is there anyone else in your household who may be familiar with your household's participation in the program?

- ❑ Yes [GO TO Q-3]
- ❑ No [THANK RESPONDENT AND TERMINATE INTERVIEW]
- ❑ Don't know [THANK RESPONDENT AND TERMINATE INTERVIEW]

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Q-3 May I speak with that person?

- ❑ Yes [RETURN TO Q-1 AND BEGIN QUESTIONS WITH NEW RESPONDENT]
- ❑ No [THANK RESPONDENT AND TERMINATE INTERVIEW]
- ❑ Don't know [THANK RESPONDENT AND TERMINATE INTERVIEW]

RESPONDENT BACKGROUND

As a reminder, your responses to this survey will be kept completely confidential. I'll begin with a few questions about your decision to participate in the program.

Q-4 How did you learn of the Arkansas Weatherization Program? [SELECT ALL THAT APPLY]

- ❑ Information that came in the mail
- ❑ Newspaper or magazine article/ad
- ❑ Contractor
- ❑ Word of mouth from friends, relatives, or others
- ❑ TV ad
- ❑ Radio ad
- ❑ Utility bill message
- ❑ Utility website
- ❑ Other website
- ❑ Local community action agency
- ❑ Other (*Specify*) _____
- ❑ Don't know [DO NOT READ]

Q-5 What is the main reason you decided to participate in the program? [SELECT ALL THAT APPLY]

- ❑ To reduce my monthly gas bill
- ❑ To reduce my monthly electric bill
- ❑ The AWP paid for some or all of the improvements
- ❑ Contractor recommendation
- ❑ Utility recommendation or information *(Specify which utility)* _____
- ❑ Recommendation from a friend, relative, neighbor
- ❑ Community action agency recommendation
- ❑ It is the right thing to do
- ❑ Help save the environment
- ❑ Save energy
- ❑ Other (*Specify*) _____

Q-5A Of the things you mentioned, which was the most important?

- ❑ To reduce my monthly gas bill
- ❑ To reduce my monthly electric bill

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- ❑ The AWP paid for some or all of the improvements
- ❑ Contractor recommendation
- ❑ Utility recommendation or information *(Specify which utility)* _____
- ❑ Recommendation from a friend, relative, neighbor
- ❑ Community action agency recommendation
- ❑ It is the right thing to do
- ❑ Help save the environment
- ❑ Save energy
- ❑ Other (*Specify*) _____

MEASURE INSTALLATION

Next, I have some questions about the work that was performed in your home through the Arkansas Weatherization Program.

Q-6 Since the work was performed, have you removed or replaced any of the equipment or energy efficiency improvements implemented in your home through the program?

- ❑ Yes *(Please specify which items have been removed or replaced):* _____ _____
- ❑ No
- ❑ Don't know

[IF Q-6 = Yes, Ask Q-7. Otherwise skip to Q-8]

Q-7 Why did you remove or replace these items? [SELECT ALL THAT APPLY]

- ❑ They were no longer working properly
- ❑ I purchased new items that I liked better
- ❑ I liked my old items better so I reinstalled them
- ❑ I performed some remodeling or maintenance that required the removal of these items
- ❑ Other: _____
- ❑ Don't know

OVERALL ENERGY EFFICIENCY DECISION MAKING

Q-8 Based on your experience with the Arkansas Weatherization Program, would you recommend the program to a friend or family member?

- ❑ Yes [SKIP TO Q-9]
- ❑ No [ASK Q-8A]

Q-8A Why wouldn't you recommend the Arkansas Weatherization Program to a friend or family member? [OPEN-ENDED]

_____
_____

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Q- 9 Prior to the audit, how familiar were you with the benefits of installing various energy efficiency improvements similar to those offered by the Arkansas Weatherization Program?

- ❑ 5: Very familiar
- ❑ 4: Somewhat familiar
- ❑ 3: Neither familiar nor unfamiliar
- ❑ 2: Somewhat unfamiliar
- ❑ 1: Very unfamiliar
- ❑ 99: Don't know

Q-9A Prior to the audit, how familiar were you with various household energy saving activities such as washing with cold water, reducing your use of light fixtures, and adjusting heating system settings?

- ❑ 5: Very familiar
- ❑ 4: Somewhat familiar
- ❑ 3: Neither familiar nor unfamiliar
- ❑ 2: Somewhat unfamiliar
- ❑ 1: Very unfamiliar
- ❑ 99: Don't know

Q-9B Prior to the audit, did you perform any common household energy saving activities? If so, which activities?

- ❑ Yes *(please explain):* _____
  _____
- ❑ No
- ❑ Don't know

Q-10 As a result of your experience with the Arkansas Weatherization Program, how much more knowledgeable would you say you are about energy efficiency and energy efficient options for your home?

- ❑ Much more knowledgeable than before participating
- ❑ Somewhat more knowledgeable than before participating
- ❑ Slightly more knowledgeable than before participating
- ❑ No more knowledgeable than before participating
- ❑ Don't know

Q-11 As a result of your experience with the program, do you now take additional action to save energy in your home, such as wash with cold water, reduce your use of light fixtures, and adjust heating system settings?

- ❑ Yes *(please explain):* _____
  _____
- ❑ No
- ❑ Don't know

PROGRAM SATISFACTION

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Now I'd like to ask you about your satisfaction with several aspects of this program.

Q-12 On a scale of 1 to 5, where "5" is very satisfied and "1" is very dissatisfied, and a "3" is neutral, how would you rate your satisfaction with the following? [RECORD AS '99' IF DON'T KNOW]

Element of Program Experience	***Very Satisfied*** **[5]**	***Somewhat Satisfied*** **[4]**	***Neither Satisfied or Dissatisfied*** **[3]**	***Somewhat Dissatisfied*** **[2]**	***Very Dissatisfied*** **[1]**	***Don't Know*** **[99]**
Information provided by the community action agency	❑	❑	❑	❑	❑	❑
The quality of installation work	❑	❑	❑	❑	❑	❑
The performance of the equipment installed	❑	❑	❑	❑	❑	❑
The savings on your monthly utility bills	❑	❑	❑	❑	❑	❑
The effort required for the application process	❑	❑	❑	❑	❑	❑
The wait-time to receive services	❑	❑	❑	❑	❑	❑
Information provided by utilities on how to reduce your utility bill	❑	❑	❑	❑	❑	❑
Improvement in home comfort	❑	❑	❑	❑	❑	❑
Usefulness of the energy audit	❑	❑	❑	❑	❑	❑
Overall program experience	❑	❑	❑	❑	❑	❑

Q-13 (If any item in Q-12 rated 2 or 1) Why were you dissatisfied with [Program Element]? [VERBATIM]:

_____
_____
_____

Q-14 Are there any changes or improvements you would like to see for the Arkansas Weatherization Program? [VERBATIM]:

_____
_____
_____

DEMOGRAPHICS

Finally, I have a few questions about your household. As a reminder, your responses will remain confidential.

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Q-15 When was your home built? [IF RESPONDENT DOES NOT GIVE VERBATIM ANSWER, READ OFF YEAR RANGES UNTIL RESPONDENT INDICATES ONE]

- ❑ Verbatim____
- ❑ Before 1970's
- ❑ 1970's
- ❑ 1980's
- ❑ 1990-1994
- ❑ 1995-1999
- ❑ 2000-2005
- ❑ 2006 or newer
- ❑ Don't know [DON'T READ]
- ❑ Refused

Q-16 What is the approximate square footage of your home? [IF RESPONDENT DOES NOT GIVE VERBATIM ANSWER, READ OFF SIZE RANGES UNTIL RESPONDENT INDICATES ONE]

- ❑ Verbatim____
- ❑ Less than 1,000
- ❑ 1,001-1,500
- ❑ 1,501-2,000
- ❑ 2,001-2,500
- ❑ Greater than 2,500
- ❑ Don't know [DON'T READ]
- ❑ Refused

Q-17 How many bedrooms are there in your home?

- ❑ Quantity:____
- ❑ Don't know [DON'T READ]
- ❑ Refused

Q-18 What type of heating system do you have in your home?

- ❑ Natural gas heating
- ❑ Electric heating
- ❑ Combination of types *(Specify):*_____
- ❑ Other *(Specify):* _____
- ❑ Don't know [DON'T READ]

Q-19 What type of water heater do you have in your home?

- ❑ Natural gas water heater
- ❑ Electric water heater
- ❑ Other *(Specify):* _____
- ❑ Don't know [DON'T READ]

Q-20 How many bathrooms are there in your home?

- ❑ Quantity:____

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- ❑ Don't know [DON'T READ]
- ❑ Refused

Q-21 How many showers are there in your home?

- ❑ Quantity:____
- ❑ Don't know [DON'T READ]
- ❑ Refused

Q-22 Including yourself, how many people currently live in your home year-round?

- ❑ Quantity:____
- ❑ Don't know [DON'T READ]
- ❑ Refused

Q-23 Do you have any other comments that you would like to relay to Arkansas Weatherization Program staff about energy efficiency in residences or about these programs in general? [VERBATIM]

_____

_____

_____

This completes the survey. Your input is greatly appreciated.Thank you very much for your time!

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6.0 Appendix C

Promotional Material

Docket No. 07-082-TF

2015 Annual Report

April 29, 2016

Southwestern Electric Power Company - SWEPCO
Posted by Peter Main [?] · about a minute ago

Arkansas customers - It's a super time for appliance shopping with $75 rebates for qualifying ENERGY STAR refrigerators, clothes washers and window A/C units. For details, visit http://www.SWEPCOgridSMART.com/ or call 1-888-266-3130.

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AEP SOUTHWESTERN ELECTRIC POWER COMPANY
A unit of American Electric Power

Facebook & Twitter Posts

January 2015

1. Facebook:

Home heating problems getting you down? SWEPCO offers cash back for all of our Arkansas customers on upgrades that'll take your home comfort to the next level. Our Standard Home Improvement Rebates includes rebates for insulation, air sealing, HVAC replacement and more. For more information check out SWEPCOgridSMART.com or give us a call at 1-888-266-3130.

Tweet:

Heating problems got you down? We're giving rebates to Arkansas customers for insulation, air sealing, HVAC and more: http://bit.ly/1v9q5ss

2. Facebook:

It's the time of year when your home heating problems can really drag you down, so start fighting the cold with help from our Standard Home Improvement Rebates. The program gives our Arkansas customers rebates on insulation, air sealing, duct sealing, HVAC replacement, heat pump replacement, and ENERGY STAR windows. Give us a call at 1-888-266-3130 or visit SWEPCOgridSMART.com for details.

Tweet:

AR customers fight the cold with our Residential Rebate Program. Rebates on insulation, duct sealing, HVAC and more: http://bit.ly/1v9q5ss

3. Facebook:

As if having new appliances isn't rewarding enough, we're offering our Arkansas customers $75 rebates for qualifying ENERGY STAR refrigerators, clothes washers and window A/C units. Through our Appliance Rebate Program you can ring in the new year with the highest-quality appliances. For details visit SWEPCOgridSMART.com or call 1-888-266-3130.

Tweet:

We're giving away $75 rebates to AR customers when they upgrade to qualifying fridges, washers & A/C units: http://bit.ly/13xyaRB #clicktosave

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Facebook & Twitter Posts

4. Facebook:

If your appliances are a little worse for the wear, now's a great time to take advantage of our Appliance Rebate Program. We're giving our Arkansas customers cash in their pocket if they upgrade to a qualifying ENERGY STAR clothes washer, refrigerator, or A/C unit. Check out the details at SWEPCOgridSMART.com or give us a call at 1-888-266-3130.

Tweet:

Appliances the worse for wear? Arkansas customers can get cash back for qualifying fridge, washer, window A/C units: http://bit.ly/13xyaRB

5. Facebook:

Our Arkansas customers can save a little green on their electric bill—check out our Lighting Rebate Program which offers discounts on select CFL and LED bulbs at your local retailer. To find out which bulbs qualify, look for SWEPCO signage or ask a sales representative at the store. For more info give us a call at 1-888-266-3130 or visit SWEPCOgridSMART.com.

Tweet:

Arkansas customers can save a little green—we're offering discounts on CFL and LED bulbs at your local retailer. http://bit.ly/1xMBq7C

6. Facebook:

Energy efficient light bulbs are a great way to save money and reduce your electricity usage, so why not make the switch? Our Lighting Rebate Program offers Arkansas customers a discount on select CFL and LED bulbs at their local retailer. For those in the Fayetteville area, check out our exciting discounts on Cree brand LED bulbs at your local Home Depot. For more details give us a call at 1-888-266-3130.

Tweet:

Fayetteville AR customers—check out your local Home Depot for great discounts on Cree brand LEDs. Call for more details at 1-888-266-3130

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Facebook & Twitter Posts

7. Facebook:

Our Arkansas customers can ring in the new year with our money-saving Home Performance with ENERGY STAR Program. If you want to save energy but don't know where to start, we offer a $300 discount on comprehensive home energy audits from independent contractors.

Find out about more about this and other discounts at http://swepcogridsmart.com/arkansas/homesPerformanceES.html.

Tweet:

Arkansas customers can enjoy a full home energy audit and great rebates with our ENERGY STAR program: http://bit.ly/1Cxscw2 #energystar

8. Facebook:

For our Arkansas customers: gear up for the new year with a comprehensive home energy audit through our Home Performance with ENERGY STAR Program. A qualified contractor will walk you through the process of finding out which upgrades are best for your home and tell you about our exciting rebates. For more information visit us at http://swepcogridsmart.com/arkansas/index.html.

Tweet:

AR customers can ring in 2015 with a home energy audit via our ENERGY STAR Homes Program. Awesome rebates to boot! http://bit.ly/1Cxscw2

BILL MESSAGE REQUEST FORM

APSC FILED Time: 4/29/2016 12:50:49 PM: Recvd 4/29/2016 12:51:13 PM: Docket 07-082-TF-Doc. 396

INSTRUCTIONS:
Complete this form and forward via e-mail to the email group "Bill Messaging" at least 10 workdays before message request date/cycle.

Note: Any bill message requests that require detailed programming changes must be submitted a minimum of 30 calendar days in advance of the requested begin date of the message. This is so CSS will have time to process the request.

REQUESTOR INFORMATION:

Name: Sherry McCormack	
Phone Number: 8.709.2404	**Date Submitted: July 15, 2015**
Business Unit: 159	
PUC/SC Order: ☐ **Yes** ☑ **No**	**If Yes, Please supply Order #:**

OPERATING COMPANIES/STATES REQUIRING THE MESSAGE: Please select all that applies

☐ **All**	☐ **04 – IN (IMCO)**	☐ **95 – OK (PSO)**
☐ **01 –TN (KGSPT)**	☐ **04 – MI (IMCO)**	☑ **96- AR (SWEPCO)**
☐ **02 – VA (APCO)**	☐ **06 - WV (WPCO)**	☐ **96- LA (SWEPCO)**
☐ **02- WV (APCO)**	☐ **07 - OH (OPCO)**	☐ **96 - TX (SWEPCO)**
☐ **03-KY (KPCO)**	☐ **10 - OH (CSP)**	☐

CHOICE OR NON-CHOICE ACCOUNTS

☐ **CHOICE ONLY**	☐ **NON-CHOICE ONLY**	☐ **ALL**

ACCOUNT TYPES THAT REQUIRE THE MESSAGE: Please select all that applies

☐ **ALL**	☐ **INDUSTRIAL**	☐ **COMMERCIAL**
☑ **RESIDENTIAL**	☐ **PUBLIC AUTHORITY**	☐ **Other -**

ACCOUNT STATUS: Please select all that applies

☐ **ALL-Includes finaled accounts.**	☑ **ACTIVE**	☐ **FINAL**

MESSAGE EFFECTIVE DATE/CYCLE: Please select all that applies.

Start DATE for message: August, 2015	
Beginning cycle:	**Ending cycle:**
Duration: Month of August	
All Cycles: ☑ **Yes** ☐ **No**	**Number of Days:**

REQUESTED BILL MESSAGE: ☑ **New** ☐ **Existing**

COMMENTS:

SWEPCO believes that home should be where the savings are. With our rebates and network of skilled, local contractors, taking the first steps toward energy savings is easier and more affordable. Visit SWEPCOgridSMART.com or call 888-266-3130 to get started.

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BILL MESSAGE REQUEST FORM

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Note: Any bill message requests that require detailed programming changes must be submitted a minimum of 30 calendar days in advance of the requested begin date of the message. This is so CSS will have time to process the request.

REQUESTOR INFORMATION:

Name: Sherry McCormack	
Phone Number: 8.709.2404	**Date Submitted: May 15, 2015**
Business Unit: 159	
PUC/SC Order: ☐ **Yes** ☑ **No**	**If Yes, Please supply Order #:**

OPERATING COMPANIES/STATES REQUIRING THE MESSAGE: Please select all that applies

☐ **All**	☐ **04 – IN (IMCO)**	☐ **95 – OK (PSO)**
☐ **01 –TN (KGSPT)**	☐ **04 – MI (IMCO)**	☑ **96- AR (SWEPCO)**
☐ **02 – VA (APCO)**	☐ **06 - WV (WPCO)**	☐ **96- LA (SWEPCO)**
☐ **02- WV (APCO)**	☐ **07 - OH (OPCO)**	☐ **96 - TX (SWEPCO)**
☐ **03-KY (KPCO)**	☐ **10 - OH (CSP)**	☐

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☐ **ALL**	☐ **INDUSTRIAL**	☐ **COMMERCIAL**
☑ **RESIDENTIAL**	☐ **PUBLIC AUTHORITY**	☐ **Other -**

ACCOUNT STATUS: Please select all that applies

☐ **ALL-Includes finaled accounts.**	☑ **ACTIVE**	☐ **FINAL**

MESSAGE EFFECTIVE DATE/CYCLE: Please select all that applies.

Start DATE for message: June, 2015	
Beginning cycle:	**Ending cycle:**
Duration: Month of June	
All Cycles: ☑ **Yes** ☐ **No**	**Number of Days:**

REQUESTED BILL MESSAGE: ☑ **New** ☐ **Existing**

COMMENTS:

Our residential energy efficiency programs provide rebates to SWEPCO customers who complete qualifying energy efficient upgrades. Visit SWEPCOgridSMART.com or call 888-266-3130 to get the rebates you deserve. And remember: home is where the savings are.

BILL MESSAGE REQUEST FORM

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REQUESTOR INFORMATION:

Name: Sherry McCormack	
Phone Number: 8.709.2404	**Date Submitted: April 13, 2015**
Business Unit: 159	
PUC/SC Order: ☐ **Yes** ☑ **No**	**If Yes, Please supply Order #:**

OPERATING COMPANIES/STATES REQUIRING THE MESSAGE: Please select all that applies

☐ **All**	☐ **04 – IN (IMCO)**	☐ **95 – OK (PSO)**
☐ **01 –TN (KGSPT)**	☐ **04 – MI (IMCO)**	☑ **96- AR (SWEPCO)**
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☐ **02- WV (APCO)**	☐ **07 - OH (OPCO)**	☐ **96 - TX (SWEPCO)**
☐ **03-KY (KPCO)**	☐ **10 - OH (CSP)**	☐

CHOICE OR NON-CHOICE ACCOUNTS

☐ **CHOICE ONLY**	☐ **NON-CHOICE ONLY**	☐ **ALL**

ACCOUNT TYPES THAT REQUIRE THE MESSAGE: Please select all that applies

☐ **ALL**	☐ **INDUSTRIAL**	☐ **COMMERCIAL**
☑ **RESIDENTIAL**	☐ **PUBLIC AUTHORITY**	☐ **Other -**

ACCOUNT STATUS: Please select all that applies

☐ **ALL-Includes finaled accounts.**	☑ **ACTIVE**	☐ **FINAL**

MESSAGE EFFECTIVE DATE/CYCLE: Please select all that applies.

Start DATE for message: May, 2015	
Beginning cycle:	**Ending cycle:**
Duration: Month of May	
All Cycles: ☑ **Yes** ☐ **No**	**Number of Days:**

REQUESTED BILL MESSAGE: ☑ **New** ☐ **Existing**
COMMENTS:

Home is where the savings are. Explore rebates on energy efficiency home improvements at SWEPCOgridSMART.com or call 888-266-3130.

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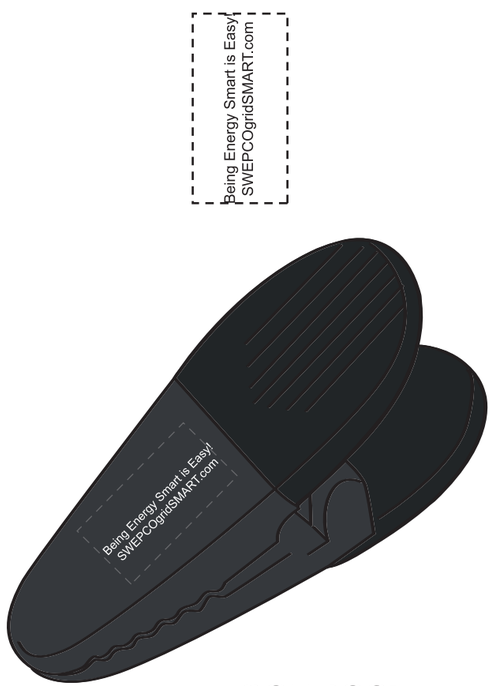
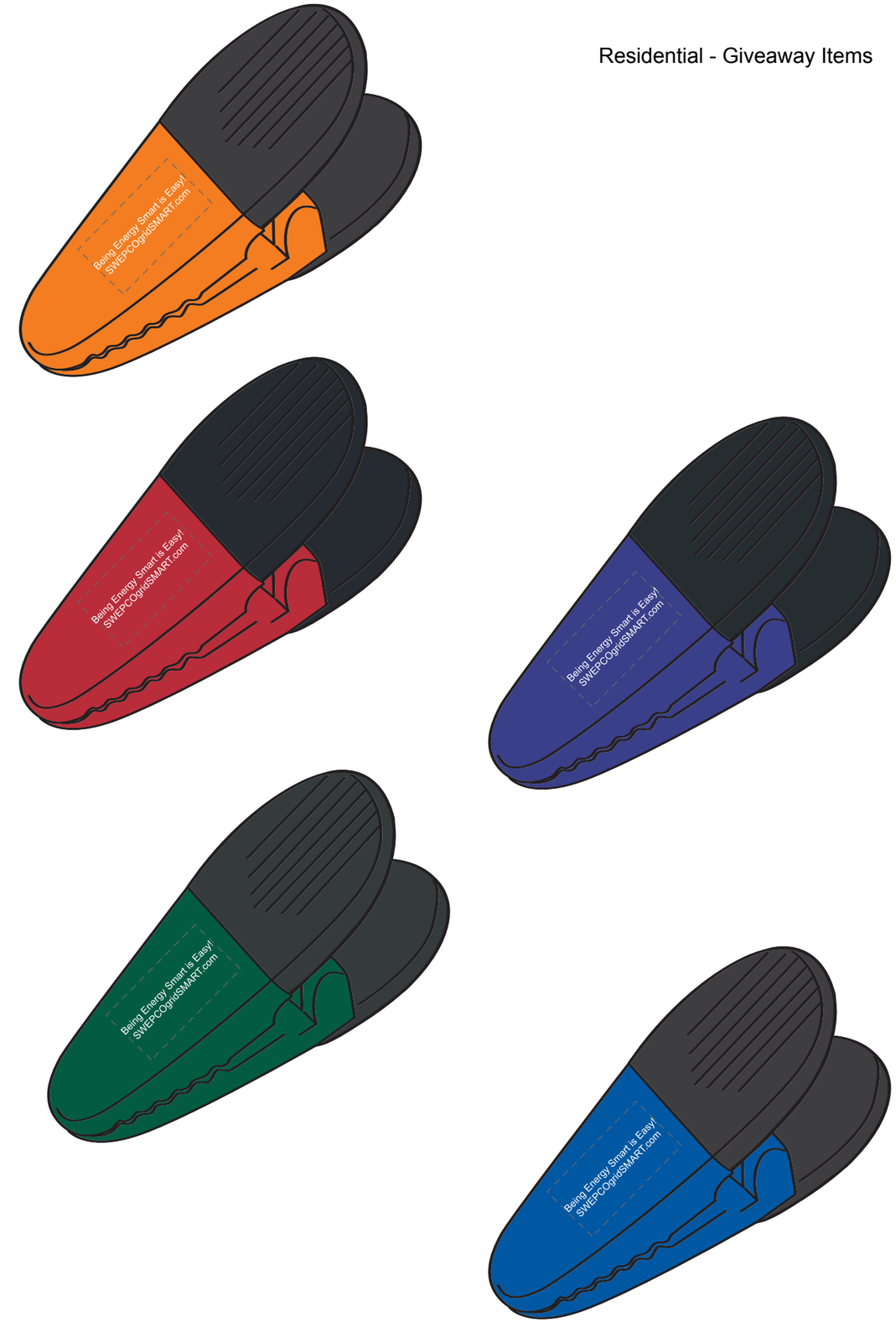
Being Energy Smart is Easy!
SWEPCOgridSMART.com

FPO



COMPOSITE
NOT ACTUAL SIZE



Dashed Line For Imprint Area Only, Will Not Print.

	Artist/Date: 01/27/15 Order #: 2623647 Ship Date: 02/03/15 Imprint Color: White Item Color:	Item #: 195 Max Imprint Size: 1.25″ w x 5/8″h Imprint Type: SS	Proofing:

1" 0.5" 0" 0.5" 1"

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Inman Promotional Team
5619 Dyer Street, Suite 101
Dallas, TX 75206
214-361-1045, 214-361-0439 fax
carrie@inmanpromo.com

Date: July 30. 2014

To: Meghan McCoy - CLEAResult

From: Carrie Riney

Item	Quantity	Unit Price	Total
Message Pens		$	$
Setup charge – 6 messages		$	$
If you want logo on barrel or clip		$	$
Setup charge – one color logo		$	$

- Production time: Approximately 7-10 working days upon receipt of artwork plus ship time. Over/underruns +/-5-10%

By my signature below, I hereby authorize IPT to move forward with production of the above specified items. I understand that if cancellation of this order is desired, I will be responsible for any charges incurred prior to the date of cancellation.

_____ _____ _____
Printed Name Signature Date

Note: Quotation is subject to change after 30 days. **Quotation does not include S&H charges or State Sales Tax.** Terms of Sale: 100% Upon Delivery

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CUT

CUT
5x0.5

FOLD

5x2.125
IMPRINT

AEP SOUTHWESTERN ELECTRIC POWER COMPANY℠

A unit of American Electric Power

SWEPCOgridSMART.com

FOLD

AEP SOUTHWESTERN ELECTRIC POWER COMPANY℠

A unit of American Electric Power

SWEPCOgridSMART.com

FOLD

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FOLD

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CUT

CUT

CUT

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COMPANY INMAN PROMOTIONAL TEAM INC
ORDER ID 3169721
IMPRINT COLOR BLACK
P.O. 52827

PLEASE NOTE: LOGO(S) ARE SHOWN AT MAX IMPRINT

DISCLAIMER: PLEASE VERIFY IF ALL ARTWORK, TYPESETTING, IMPRINT COLOR(S), LOCATION(S) IMPRINT SIZE(S) AND ITEM COLOR(S) ARE CORRECT BEFORE APPROVING THE ORDER.

PROOF NOTES AND ART CONCERNS

Residential - Q1 Billboard

Residential - Q2 Billboard

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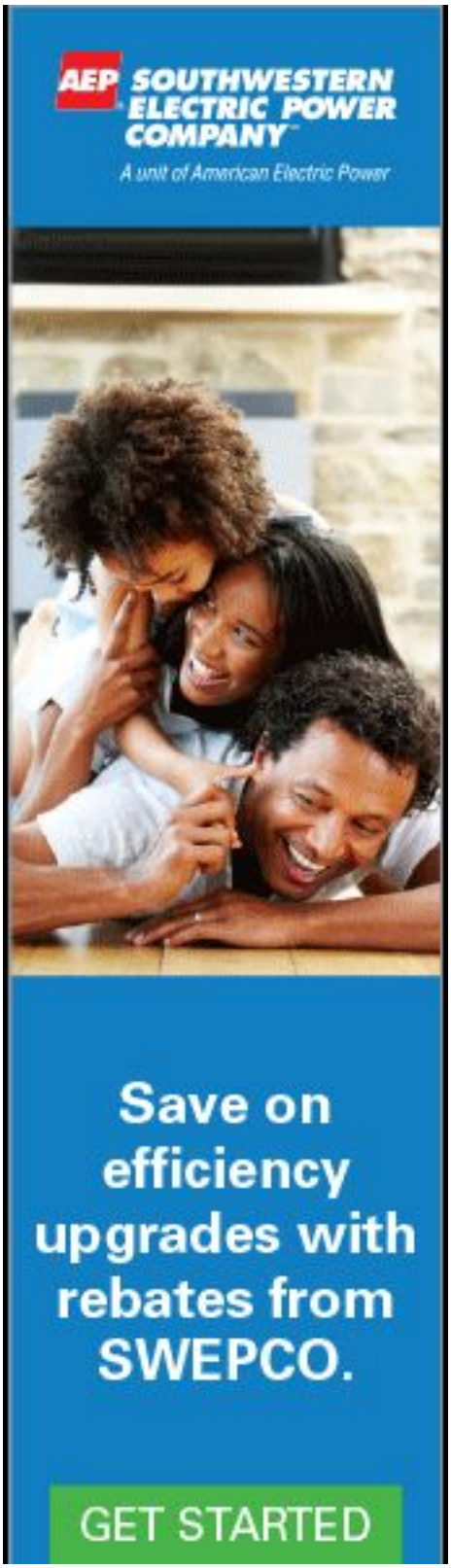

Residential - Q3 Billboard

Savings where you live.

Spending where it counts.

888-266-3130
SWEPCOgridSMART.com

AEP SOUTHWESTERN ELECTRIC POWER COMPANY
A unit of American Electric Power

You're just one click away from two ways to save.

1. **Online Marketplace:** For a simple way to shop energy-efficient products for your home, SWEPCO's online store offers discounts on lighting and power strips that reduce energy use. Lowering your energy bill means one thing—the freedom to spend your money on what matters to you.

2. **Online Rebate Center:** Submit your rebate online to save even more on ENERGY STAR® qualified refrigerators, clothes washers, and window a/c units.

gridSMART®
From Southwestern Electric Power Company

**More ways to save.
Just a click away.**

1. Visit **SWEPCOgridSMART.com/onlinerebates** and enter your ZIP code in the left-hand corner for special SWEPCO customer pricing.

2. Check out **SWEPCOgridSMART.com/marketplace** for more on appliance rebates.

Score big savings this season.

Receive up to $380 in rebates on qualifying duct and air sealing upgrades!

888-266-3130
SWEPCOgridSMART.com

AEP SOUTHWESTERN ELECTRIC POWER COMPANY
A unit of American Electric Power

Did you know your home could be losing up to 30% of its air due to leaks and poorly connected ducts? That loss means higher energy bills and uncomfortable temperatures.

When a participating contractor performs air and duct sealing upgrades to your home, you can:

- Increase comfort throughout the home
- Improve indoor air quality
- Control humidity
- Decrease your monthly utility bill

gridSMART®
From Southwestern Electric Power Company

More ways to save.
Just a click away.

Check out **SWEPCOgridSMART.com** for more ideas on how to upgrade your home and find a participating contractor.

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Get ready for HVAC season.

It's almost time for your HVAC's greatest obstacle yet: summer. And while you're soaking up the sun, it'll be working endlessly to keep your home cool and comfortable.

Although its toughest challenge is ahead, there's still time to whip your A/C unit into shape with a few simple maintenance tips:

- Before the heat wave hits, be sure to clear your unit of leaves and grass.
- Make sure to replace your air filter every 90 days; we recommend using a high-efficiency pleated filter.
- Don't forget to trim nearby shrubs and plants to give your A/C unit room to breathe.

Now's the time to prepare your HVAC for the grueling months to come. Check out more tips here.

Has your HVAC hit a wall?
It may be time to consider a replacement; learn more about SWEPCO's replacement rebates at SWEPCOgridsmart.com.

SWEPCOgridSMART.com
888-266-3130

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AEP SOUTHWESTERN ELECTRIC POWER COMPANY
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You have the power to save.

For one week only, SWEPCO is offering its Arkansas residential customers a package of energy-saving products worth $63 for *just $10*.

Here's what's included:

One omni-directional 9-watt LED bulb (60 W equivalent)

7-outlet advanced PowerStrip

Six 13-watt spiral CFL bulbs (60 W equivalent)

This is a limited time offer.* Act now to enjoy long-term energy savings for your home.

Click here to order your energy-saving kit today.

*Offer available October 5th-9th. Kits are available on a first come, first served basis while supplies last.

Questions?
Call **888-266-3130** or
email **info@swepcogridsmart.com**

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SWEPCO AR Facebook & Twitter Posts

1. **Facebook:** Are you looking to upgrade your appliances? Through SWEPCO's online rebate center, you can receive a $75 rebate on qualified ENERGY STAR® clothes washers, refrigerators and window A/C units.

   Check out the link below to start saving:

   www.go2claim.com/swepcoar

   Twitter: Receive a $75 rebate for upgrading to a qualified ENERGY STAR® clothes washer, refrigerator or window A/C units: http://bit.ly/1IEgmn2

2. **Facebook**: What's better than saving energy with your new ENERGY STAR® appliances? Getting cash back for making the switch. Get $75 rebates for qualified appliance upgrades through our online rebate center:

   www.go2claim.com/swepcoar

   Twitter: What's better than saving energy on your new ENERGY STAR® appliances? Getting cash back for making the switch: http://bit.ly/1IEgmn2

3. **Facebook:** There's a faster way to claim your ENERGY STAR® appliance rebates. Check out our online rebate center and get $75 cash back on qualified appliances:

   www.go2claim.com/swepcoar

   Twitter: There's a faster way to claim your ENERGY STAR® appliance rebates; get $75 cash back from our simple online center: http://bit.ly/1IEgmn2

4. **Facebook**: SWEPCO's online rebate center can send you on the path to more savings when you upgrade to ENERGY STAR® appliances. Check out the link below for more info:

   www.go2claim.com/swepcoar

   Twitter: SWEPCO's online rebate center can send you on the path to more savings when you upgrade to ENERGY STAR® appliances: http://bit.ly/1IEgmn2

Start Saving Today!

1. Determine your eligibility for rebates by calling **888-266-3130** or visiting **SWEPCOgridSMART.com**.
2. Reserve your rebate by downloading and submitting a rebate reservation form.
3. Use our website to find a local installation contractor who can help you implement your selected upgrade(s).
4. We'll send you a rebate check 4-6 weeks after your contractor completes the upgrade(s) and provides us with the required paperwork.

To learn more about energy efficiency programs from SWEPCO, call **888-266-3130** or visit **SWEPOgridSMART.com**.

Contractor Network

HVAC

- Sturdivant's: 479-751-2178
- Air Control: 479-756-0199
- Bud Anderson Heating & Cooling: 479-927-2700

Insulation

- Cellulose One: 479-200-5003
- e3 Solutions: 903-360-8276

ENERGY STAR® Windows

- Windows World of the Ozarks: 479-725-2450
- Evans Construction: 479-530-0801

Home Performance with ENERGY STAR®

- NECS: 214-382-9696
- Energy Misers: 817-456-4246

ENERGY STAR AWARD 2015
PARTNER OF THE YEAR

AEP SOUTHWESTERN ELECTRIC POWER COMPANY℠
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SWEPCOgridSMART.com
888-266-3130

AEP SOUTHWESTERN ELECTRIC POWER COMPANY℠
A unit of American Electric Power

Earn Rebates on Energy-Efficient Home Improvements!

SWEPCO makes it simple to save energy and improve the comfort of your home with insulation upgrades, duct sealing, air conditioner or heat pump replacement, air sealing and more.

gridSMART®
From Southwestern Electric Power Company

SWEPCO's Standard Home Improvement Rebate Program and Home Performance with ENERGY STAR® Program provides rebates and a network of qualified installation contractors to make it easy to install energy-efficient measures like those listed below.

Measure	Description	Pre-Upgrade Requirements	Rebate Potential
Attic and Wall Insulation	When combined with air sealing, added insulation can make your home more comfortable while reducing your heating and cooling costs by 20 percent	Your ceiling must be uninsulated or insulated with materials rated R-22 or less (about 6 inches or less)	**$0.10** to **$0.25** per square foot of ceiling insulation and **$0.12** to **$0.15** per square foot of wall insulation
ENERGY STAR® Windows	ENERGY STAR windows offer durable, low-maintenance framing materials, two panes of insulated glass, special coatings that reflect infrared light, and gas-filled window panes that reduce heat transfer	Your home must be equipped with clear windows that are not made of low-emissivity glass	**$1.60** to **$2.00** per square foot of window
Air Sealing	During an air sealing service, SWEPCO's qualified contractors use diagnostic testing equipment to identify and properly seal air leaks, which helps save energy and remove dust, allergens and pollutants from the air in your home	Air sealing must have the potential to reduce air leakage in your home by 20 percent or more	**$80** to **$150**
Air Conditioner or Heat Pump Replacement	If your heating and cooling system is more than 15 years old, you could reduce your energy costs by hundreds of dollars per year when you install a new high-efficiency heating and cooling system	Existing equipment must be 13 SEER or less	**$140** to **$825** per system
Duct Sealing	Engaging SWEPCO's qualified contractors to evaluate your duct system, seal leaks and repair or replace damaged ducts can greatly improve home comfort and reduce your heating and cooling costs by as much as 20 percent	Ducts must have at least 10% leakage prior to duct sealing	**$140** to **$300** per system
Comprehensive Energy Assessment	This service includes a visual home inspection, diagnostic and combustion safety testing, and an energy assessment report that lists recommended energy efficiency improvements, available rebates and projected cost savings	The highest electric bill that you received in last 12 months should be no less than $0.10 per square foot	**$300** plus a **$100** bonus if you complete two or more recommended measures within 6 months of assessment

What Our Customers Are Saying

"As a result of my comprehensive home energy assessment and energy efficient upgrades, I felt an immediate difference. The duct sealing and air sealing really helped with the comfort level in my home. This is a wonderful service!"

- Bonnie F., homeowner

Start Saving Today!

1. Determine your eligibility for rebates by calling **888-266-3130** or visiting **SWEPCOgridSMART.com**.
2. Reserve your rebate by downloading and submitting a rebate reservation form.
3. Use our website to find a local installation contractor who can help you implement your selected upgrade(s).
4. We'll send you a rebate check 4-6 weeks after your contractor completes the upgrade(s) and provides us with the required paperwork.

To learn more about energy efficiency programs from SWEPCO, call **888-266-3130** or visit **SWEPOgridSMART.com**.

Contractor Network

HVAC

- Carver's Refrigeration, Heating and Cooling: 870-289-2033
- Thomas Bui: 870-773-8193

Insulation

- RWE, LLC: 903-556-9152
- Davis Insulation Plus: 903-824-4762
- Superior Insulation: 903-793-1945

Home Performance with ENERGY STAR®

- Sustainable Services: 903-838-1014
- KMT Energy Solutions: 903-794-0088

ENERGY STAR® Windows

- 2M Door and Window: 870-845-1623

ENERGY STAR AWARD 2015
PARTNER OF THE YEAR

AEP SOUTHWESTERN ELECTRIC POWER COMPANY
A unit of American Electric Power

SWEPCOgridSMART.com
888-266-3130

Residential - Brochure - South

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A unit of American Electric Power

Earn Rebates on Energy-Efficient Home Improvements!

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gridSMART®
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ENERGY STAR® Windows	ENERGY STAR windows offer durable, low-maintenance framing materials, two panes of insulated glass, special coatings that reflect infrared light, and gas-filled window panes that reduce heat transfer	Your home must be equipped with clear windows that are not made of low-emissivity glass	**$1.60** to **$2.00** per square foot of window
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Comprehensive Energy Assessment	This service includes a visual home inspection, diagnostic and combustion safety testing, and an energy assessment report that lists recommended energy efficiency improvements, available rebates and projected cost savings	The highest electric bill that you received in last 12 months should be no less than $0.10 per square foot	**$300** plus a **$100** bonus if you complete two or more recommended measures within 6 months of assessment

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"As a result of my comprehensive home energy assessment and energy efficient upgrades, I felt an immediate difference. The duct sealing and air sealing really helped with the comfort level in my home. This is a wonderful service!"

- Bonnie F., homeowner

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START
Give your HVAC a head start this summer.
AEP SOUTHWESTERN ELECTRIC POWER COMPANY
A unit of American Electric Power

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AEP SOUTHWESTERN ELECTRIC POWER COMPANY™
A unit of American Electric Power

Lowering your energy bill has never been easier

Dear SWEPCO customer,

Did you know there's a simple way to save on energy improvements for your home? With SWEPCO's Standard Home Improvement Program, residential customers in Arkansas can receive a variety of rebates on home energy efficiency upgrades.

Whether you're looking to install duct sealing, replace your air conditioner, or just get a general idea of your home energy needs, we're here to help you save energy and money every step of the way.

Keep in mind that you'll need to use a contractor from our Contractor Network to be eligible for rebates. Visit **SWEPCOgridSMART.com** or call **888-266-3130** to learn more.

Start saving today,
SWEPCO

gridSMART®
From Southwestern Electric Power Company

Residential - Internet Ads - Q2

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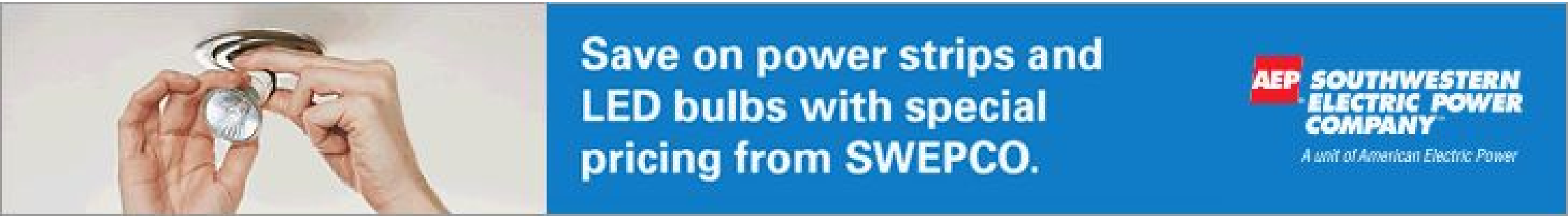
Residential - Internet Ads Q3

Residential - Internet Ads - Q3



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The Energy Wave

Quarterly Newsletter from SWEPCO's gridSMART Initiative

March 2015 - In This Issue

Did You Know?

Program News

Technical Corner

News & Events

Parting Shot

Resources

Contact Us:

SWEPCOgridSMART.com

info@SWEPCOgridSMART.com

888-266-3130

Training Opportunity

Sales and Customer Service
We'll address customer experience and how to effectively communicate with homeowners and motivate them to complete upgrades.

Venues and Dates TBD

FROM THE PROGRAM MANAGER

I want to take a minute to say thank you to all of the contractors who participated in the 2014 SWEPCO Energy Efficiency programs. It was a very successful year and we couldn't have done it without you. We hope it was successful for you, too! In 2015, we are asking all contractors to recommit to the Programs and partner with SWEPCO to offer customers the reliable, high-quality contractor network.

Being part of the SWEPCO Contractor Network offers you several professional benefits.

- Training - Throughout the year, our program staff provides education on subjects such as building science, lighting, and more.
- Technical support - The program team is here to help you through all steps of the incentive program process. Whether it's questions about QAQC, rebate forms, or energy efficiency assessments, our team is here to help you.
- Free Positive Press - Potential customers will see your company name listed on our website. Also, for contractors who have signed our co-branding agreement, you can utilize the highly recognizable gridSMART logo on your website and marketing materials.

Best of luck in 2015!

Lisa Grecho
Residential Program Manager
SWEPCO's gridSMART Initiative

Did You Know?

The customer and contractor call center is now being routed directly through the Fayetteville office. What does that mean for you? Most importantly, improved customer service. Customers interested

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In learning more about the available SWEPCO program offerings will be assisted by staff members with expert-level program knowledge. We can also help any contractors that call with program-related questions. For more information about our new in-house call center, **Beth Spencer** and **Tanner Freeman** can answer your inquiries.

You can reach the call center Monday-Friday, 8:00 AM-5:00 PM at 888-266-3130.

Program News

2015 Kick Off Meetings

Thank you to those of you who were able to attend the 2015 Residential Energy Efficiency Programs Kick Off meetings. We had a great turn out and we are looking forward to another successful year.

There are several program changes that are in place for 2015. Below is a summary of the changes that are being implemented.

Measure Changes

HVAC

- 15 SEER or higher
- 8.5 HSPF or higher for heat pumps

Top Tier Bonus (Single Family Homes)

- $100 for achieving highest tier on both duct and air sealing

Duct Sealing*

- 25%-55% leakage reduction $175 rebate
- 55%-75% leakage reduction $275 rebate
- >75% leakage reduction $325 rebate

Air Sealing*

- >20% reduction at CFM50 $100 rebate
- >40% reduction at CFM50 $150 rebate

**Duct and air sealing rebates are split 80/20 between customer and contractor for Standard Home Improvements Rebate Program, 100% to customer through Home Performance with ENERGY STAR®.*

Home Performance with ENERGY STAR

- You must reserve your Home Performance with ENERGY STAR rebates prior to beginning any work.
- Two tier assessment rebate based on home's heated and cooled square footage
  - ≤750 sq. ft. $150 rebate
  - >750 sq. ft. $300 rebate
- SourceGas & SWEPCO jointly served homes
  - ≤750 sq. ft. $75 rebate
  - >750 sq. ft. $150 rebate

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Direct Install (Multifamily and HPES)

- Advanced power strips are now eligible $30/unit installed
  - Home entertainment systems
  - Home office
- Water heater blankets are no longer eligible for a rebate
- Pipe insulation is no longer eligible for a rebate

Please contact **Jacob Nielson** or call 479-439-8627 if you have any questions about the changes made to the 2015 program.

2015 Contractor Applications

As 2015 gets underway we want to remind everyone that there is a new contractor application for 2015. If you have not already filled it out and turned it in, you still have time. We are looking for your re-commitment to the program and welcome your participation. All contractors are required to fill out the new application. We expect the total list of contractors will drop by a few in this process which will make it easier for customers to find you on our website.

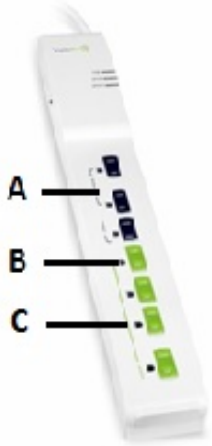
The deadline for applications is **March 31, 2015**, so don't delay. If your insurance and licenses are still current don't worry about sending them again. We look forward to another great year working with all of you. For a copy of the 2015 Contractor Application please contact **Beth Spencer**, or call 888-266-3130.

Technical Corner

Installing Smart Strips

An advanced power strip (APS) provides state-of-the art, high quality, FIREPROOF surge protection and stops standby power consumed by PC and TV peripherals (printer, speakers, charger, modem, scanner, sub-woofer, DVD player etc). Current sensing circuitry detects when a PC / TV is off and then automatically switches selected peripherals off, saving energy. Simple to install and easy to use. TV and PC installation instructions are listed below.

The TrickleStar APS (right) is made up of three sections.



Part A is the "Always On" outlets that will always stay on and need to stay on. Items to be plugged into this particular section would be a DVR, clock, wi-fi, etc.

Part B is the "Control Outlet" that manages the power for the switched outlets. There is only one Control outlet on the power strip. Items plugged into this section include televisions, personal computers, etc.

Part C is the "Switched Outlets" that will only have power provided if the Control Outlet is powered on. If the Control Outlet is off, then the circuit will be closed to the outlets and no power will be provided. Suggested items to plug into the Switched Outlets include gaming systems, amplifiers, DVD players, etc.

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TV Setup

- Step 1: Plug in device that always stays on (i.e. DVR) to the "always on" outlets
- Step 2: Plug in TV to Control outlet
- Step 3: Plug in devices to switched outlets (amp, subwoofer, gaming console, DVD player)
- Step 4: Adjust switching threshold (typically "high" for TV applications)
- Step 5: Plug in power strip to a grounded receptacle

PC Setup

- Step 1: Plug in device that always stays on (i.e. a router or modem) to the "always on" outlet
- Step 2: Plug in PC to Control outlet
- Step 3: Plug in devices to switched outlets (printer, scanner, speakers, chargers)
- Step 4: Adjust switching threshold, typically "low" or "medium" for notebooks or desktop PC's
- Step 5: Plug in power strip to a grounded receptacle

News & Events

2015 ACI National Home Performance Conference & Scholarship

We highly recommend attending the Affordable Comfort Institute's National Conference in New Orleans, LA this spring. There is a conference track for every trade. There are 15 different tracks with classes geared to every aspect of your business. This year SWEPCO will be providing two scholarships for companies who are attending. Each scholarship will cover the registration fee for one person up to $775. Please contact **Jacob Nielson**, or call 479-439-8627 for a scholarship application.

The deadline for applications is **March 24th** (last day to register for the $775 price is April 6th). Scholarship winners will be notified by March 30th.

Parting Shot

During cold winter months, poor energy efficiency can be easily spotted. Frigid weather is a great time to look for customers with missing insulation, disconnected duct work, or air leaks heating unnecessary areas of their home.

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June 2015 - In This Issue

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Marketing Corner

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888-266-3130

FROM THE PROGRAM MANAGER

Now that summer is starting to heat up, customers are going to want to stay cool. Make sure to discuss with your customers the utility rebates available to help keep the cold air flowing. Use some of the tips presented in the People First, Buildings Second™ Customer Experience Training section, to understand your customer and help them feel confident in the recommendations you are making.

Happy Summer! Stay Cool!

Sincerely,
Lisa Grecho
Residential Program Manager
SWEPCO's gridSMART Initiative

Program News

2015 ENERGY STAR® Partner of the Year Award

In April, SWEPCO's Home Performance with ENERGY STAR® (HPwES) team traveled to Washington, D.C. to attend the annual ENERGY STAR Partner of the Year Awards banquet. SWEPCO received the ENERGY STAR Partner of the Year Award in recognition of its successful implementation of the Home Performance with ENERGY STAR Program. Several key 2014 accomplishments that contributed to winning the award include:

- Generating approximately 1,700,000 kilowatt-hours in energy savings, including an installed measure conversion rate of 93 percent, up 22 percent from 2013.
- Experiencing 1,300 percent growth from 2013 to 2014 by completing 1,015 HPwES projects in 2014.
- Providing extensive program training with face-to-face mentoring sessions, six technical

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training events for program contractors, and utilizing a quality assurance/quality control process to foster best practices.
- Working collaboratively with the local natural gas utility rebate program, broadening the impact of the HPwES program, recruiting gas utility program contractors, and further enhancing the customer experience.

SWEPCO wasn't the only Arkansas company acknowledged at the awards banquet, Stitt Energy Systems, Inc., in Rogers, AR, was given the ENERGY STAR Certified Homes - Special Recognition Award for their longstanding commitment over the past 20 years of building certified ENERGY STAR homes. Congratulations, Stitt Energy!

Pictured in photo from L to R: Jacob Nielson-CLEAResult, Lisa Grecho-CLEAResult, Phil Watkins-SWEPCO, Eli Jacobson-Department of Energy, Sherry McCormack-SWEPCO, Trent Brackenridge-CLEAResult

Outreach Events

The SWEPCO team has participated in many outreach events to publicize the residential program offerings.

- NW AR Residential Contractor Kickoff Training - February 3, Fayetteville
- SW AR Residential Contractor Kickoff Training - February 5, Texarkana
- Northwest Arkansas HBA Home Show - February 13-15, Springdale
- Texarkana HBA Home Show - March 7-8, Texarkana
- Texarkana High School Environmental Expo - March 19, Texarkana
- LED Contractor Breakfast Meeting - March 25, Texarkana
- Rogers Chamber of Commerce Golf Tournament - April 20, Rogers
- Pratt & Whitney Earth Day Event - April 22, Springdale
- Fayetteville Public School Green Team Celebration - April 23, Fayetteville
- SW AR Residential Contractor Training - May 13, Texarkana
- NW AR Residential Contractor Training - May 14, Bentonville
- ACAAA Annual Conference - May 27-28, Springdale

We look forward to seeing you at upcoming events this year!

Industry News

ACI Conference

The Home Performance Coalition (formerly ACI) held their national conference in early May in New Orleans, LA. This year's conference was another great one and was well attended. There were eight contractors from the SWEPCO Contractor Network who attended the conference, and they all learned a lot. The outlook for energy efficiency is looking very positive! Nationally, programs are expanding and much work is being done. Some highlights from the conference include:

- The digital age is here! There is a big trend to move toward tablet apps for everything from scheduling, customer management, data gathering, and field work.
- Some success has been found in promoting the potential health benefits from energy efficiency improvements. One study showed 91 percent of people surveyed would spend money for perceived health benefits.
- Customers tend to spend more money on improvements if financing is an option.
- QMS (Quality Management Systems): Many companies are finding great success implementing these systems which improves both job qualities and customer interaction.
- When interacting with customers, it is easy to overwhelm them with details and jargon that is beyond their level. Keep it simple and understandable.

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Training Recap: People First, Buildings Second™

If you were unable to attend the training opportunities held in May, here's a recap of what you missed.

Amy Stevens from CLEAResult provided her expertise on the subject, *Sales and the Customer Experience,* for SWEPCO contractors. She presented proven methods for leveraging customer relationships into real assets. We learned how to effectively build customer relationships as we serve as their trusted energy advisors. We also covered how the energy efficiency business model is always evolving and how that relates to contractors. This was an insightful and interactive class that was well suited for sales people, field staff, and anyone who interacts with customers.

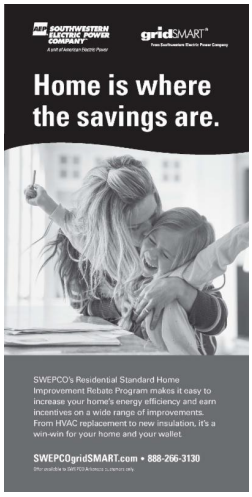
The training helped explain the customer-centric value proposition and the six core principles of delivery. Amy encouraged us to help define customer profile data to develop a 360 degree view of the customer. She painted a picture on how to elevate the voice of the customer throughout your organization.

Amy did a marvelous job of interaction with those who attended the trainings and ensured participation in a fun, enlightening manner. Overall the training was a success. Thank all to all who were able to attend and we hope that all of you can join us in future trainings.

Contact us if you'd like a copy of the training presentation.

Marketing Corner

We continue to work for you by marketing the residential rebate programs via diverse media outlets. During the second and third quarters of 2015, you can find advertisements for the residential programs including:



- 30-second TV commercials on KNWA in the mornings during The Today Show
- Print ads in the Ashdown Little River News, Booneville Democrat, De Queen Bee, Eureka Springs Lovely County Citizen, Greenwood Democrat, Lincoln-Farmington Enterprise Leader, Mansfield Citizen, Mena Star, Murfreesboro Diamond, Nashville Leader, Pea Ridge Times of Northeast Benton County, Texarkana Gazette, and the Waldron News
- Billboards on I-49 in Springdale and on the 549 Loop in Texarkana
- Internet banner ads on cox.com
- 30-second radio advertisements on KMCK, KIGL, KKIX, and KKEG in Northwest Arkansas, KENA, KMTB and KDQN in West Central Arkansas, and KPWW, KYGL, KKYR in Southwest Arkansas
- Ads in Celebrate Arkansas Magazine

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FROM THE PROGRAM MANAGER

Summer has ended, kids are back in school, and football season is here, which means cold weather is right around the corner. Home comfort issues become a much more noticeable problem during cold weather. It's hard to ignore a cold draft or a room that won't stay warm. How can program contractors help SWEPCO customers deal with comfort issues? One way is to include a Walk-thru Assessment during your service call.

SWEPCO offers a short Walk-thru Assessment Form that contractors can utilize while at the customer's home. Contractors can take a few minutes to inspect duct work for disconnects and leaks, estimate existing insulation levels, and ask the customer if they've been experiencing any comfort issues. Taking time to include a quick visual inspection and provide information about the SWEPCO rebate opportunities will build a better relationship with the customer. Better relationships can lead to customer loyalty and referrals, resulting in more money for your business.

So take a few minutes and provide even better customer service with a SWEPCO Walk-Thru Assessment, and SWEPCO will thank you with $25.

Sincerely,
Lisa Grecho
Residential Program Manager
SWEPCO's gridSMART Initiative

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Program News

Century Club Award

The SWEPCO Home Performance with ENERGY STAR® Program congratulates the 2014 Century Club Award winners: KMT Group, Inc., NECS, LLC, and SEAL Energy Solutions.

The U.S. Department of Energy presents the annual Century Club Award to participating contractors who have used a whole-house approach to improve the energy performance of 100 or more homes in the preceding calendar year and successfully fulfilled the requirements of their local Home Performance with ENERGY STAR program.

To help publicize their exemplary work, award-winning contractors have the opportunity to display the Century Club web button on their websites.

We thank the 2014 Century Club Award winners for their dedication and outstanding contributions to SWEPCO customers.

Pictured top right: Lisa Grecho, CLEAResult, Jared Smith, KMT Group, Inc., Jacob Nielson, CLEAResult, Sherry McCormack, SWEPCO

Pictured middle right: Tim Keisling, NECS, LLC, Charles Martin, NECS, LLC, Lisa Grecho, CLEAResult, Jacob Nielson, CLEAResult, Sherry McCormack, SWEPCO

Pictured lower right: Heather Nelson, SEAL Energy Solutions, Josh Davenport, SEAL Energy Solutions

Industry News

The Sustainable Conservation House

The Sustainable Conservation House, a recent addition at the University of Arkansas at Fort Smith, provides a hands-on laboratory that allows students to learn with the latest technology and prepare for future careers in the energy efficiency industry. As efforts gain momentum to require all new houses in Arkansas to undergo energy assessments, the UAFS Sustainable Conservation House will provide the ideal classroom laboratory to train the energy auditors needed to meet this new demand.

Divided into two areas, the house contains both a classroom and a laboratory. The classroom, which is located on the right side of the house, offers an area for students to learn energy efficient concepts and lessons. Those lessons will be put to practical use in the laboratory, which is on the left side of the house and serves as a model home for energy auditing. John Martini, Assistant Professor of Electronics Technology, is very excited that the lab will provide valuable hands-on learning to the UAFS students.

The house features more than 30 available built in scenarios that can be changed at the push of a button. The instructors want the laboratory to display problems like a typical house, so they are able to demonstrate different things like appliances, lighting, air flow, and water flow.

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For more information on the UAFS Sustainable Conservation House, email **John Martini** or call 479-788-7772.

Tech Corner

CoolSaver℠ A/C Tune-up Pilot

In the spring of 2016, SWEPCO will be conducting a pilot for a CoolSaver A/C Tune-up measure. This incentivized measure is a great chance for contractors to offer a no cost or minimal cost A/C tune-up that brings real savings to the homeowner. We'll begin training during the winter months so that companies are ready to offer the service next spring.

A CoolSaver A/C Tune-up consists of using prescribed equipment and software to provide:

- Cleaning the evaporator coil
- Cleaning the outdoor condenser
- Cleaning the blower
- Airflow correction
- Adjusting the refrigerant charge to manufacturer specifications

The SWEPCO program will provide participating contractors with extensive program training and scholarships to purchase necessary equipment. If your company is interested in participating please contact **Jacob Nielson**.

Manual J Training

SWEPCO will be hosting a Manual J load calculation training in Q4 of this year. It will be a full day training which will provide attendees with sound understanding and confidence in the load calculation process. Training will also highlight some free tools available to complete a Manual J.

There will also be a follow-up training on Manual D Duct Design in early 2016. After completing Manual J training, the next step is to design a duct system to achieve the air flow requirements that are needed to maintain comfort in each area of the home. This class is helpful to those who regularly trouble shoot home comfort issues caused by poor duct design.

If you are interested in either of these two classes please contact **Jacob Nielson**.

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From Southwestern Electric Power Company

Direct Install

Reduce energy use and operating costs

If you are heating water with electricity, program technicians will install electric and water saving measures at **NO COST** based on your existing equipment.

Items include:

- **High-Efficiency Spray Valves**
- **Faucet Aerators**
- **Vending Economizers**

Together, these measures can save hundreds of dollars per year in electricity, water, and sewage costs. Best of all, they're available at no cost for qualifying customers!

Estimated Annual Savings Per Faucet Aerator

Facility	kWh	kW	$
Prison	1,618	0.18	174
Hospital	161	0.01	17
Nursing Home	161	0.01	17
Dormitory	1,214	0.18	131
Lodging	161	0.01	17
Commercial	1,108	0.35	119
School	886	0.22	95

*Estimates for facilities replacing 2.2gpm aerators with 0.5gpm aerators
*Electrical savings based on IECC 2003 Climate Zone 6
*Assumes cost of electricity is $0.07/kWh and water and sewage is $0.0073/gal

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From Southwestern Electric Power Company

Interested in learning more about the Commercial & Industrial Energy Efficiency Program?

For more information or to speak with an Energy Advisor, contact:

Shannon Joyce
shannon.joyce@clearesult.com
479-439-0294

Greg Perkins
gaperkins@aep.com
479-973-2435

For more information and a list of participating contractors, visit:

www.SWEPCOgridSMART.com

gridSMART® is provided by SWEPCO as part of the company's commitment to reduce energy consumption and demand. CLEAResult Consulting, Inc. administers SWEPCO's Arkansas gridSMART initiative as an independent consultant.

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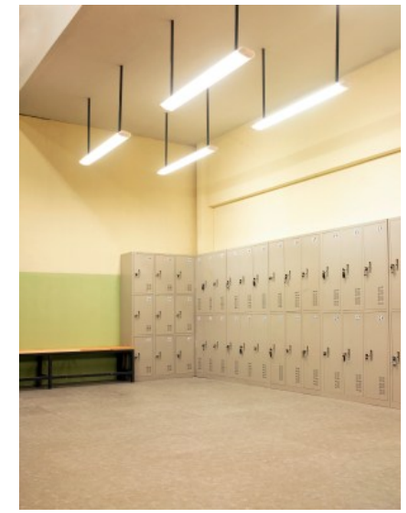
Saving Money is Simple with SWEPCO!

Commercial and Industrial

Energy Efficiency Program

Start Saving Today with SWEPCO's Energy Efficiency Incentive Program!!!



SWEPCO's Arkansas Commercial and Industrial Energy Efficiency Program provides incentives for qualifying energy-efficient improvements that reduce peak electric demand and save energy in commercial and industrial facilities.

Incentives are based on the verified electric energy and demand savings and are calculated using the program's incentive rate table*.

*See inside brochure for qualifying measures and rate table.

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Participation is Easy!

Customer Eligibility

Whether you operate a municipality, hospital, school, church or other industry, incentives are available to SWEPCO served commercial and industrial facilities with a demand of 50 kW or 200,000 kWh or higher. New construction is eligible. Consult your SWEPCO Energy Advisor for more information. For small commercial and residences, additional measures may qualify for incentives. **Custom projects are eligible and will be considered on a case by case basis.**

1. **Identify a project & Contact a SWEPCO Energy Advisor for a FREE walkthrough assessment.**
2. **Submit application, reserve incentive and SWEPCO Energy Advisor performs pre-inspection.**
3. **Implement project, measure & verify savings.**
4. **Submit project completion documents.**
5. **$$$ Receive incentive check.**

Lighting

Lighting Controls: $20/unit

Lighting Screw-In CFL (11W to 40W): $2/unit

Lighting Screw-In CFL (41W to 200W): $4/unit

LED Recessed Down Light Fixture: $20/unit

LED 5W-25W Screw-In Replacement: $10/unit

LED 1W-4W Screw-In Replacement: $5/unit

LED Exit Signs: $10/unit

Lighting Linear & Modular Fluorescent Fixtures: $175 (kW savings) + $0.0650 (kWh savings)

LED Fixture Lighting:
$220 (kW savings) + $0.1200 (kWh savings)

HVAC Upgrades

Chillers:

$288.60 (kW savings) + $0.0888 (kWh savings)

HVAC (DX, split, packaged):

$244.92 (kW savings) + $0.0754 (kWh savings)

Geothermal:

$321.10 (kW savings) + $0.0988 (kWh savings)

Refrigerator & Freezer Doors

Freezer Glass Door 0<V<15: $50/unit

Freezer Glass Door 15<V<30: $75/unit

Freezer Glass Door 30<V<50: $100/unit

Freezer Glass Door V=50: $125/unit

Refrigerator Glass Door 0<V<15: $50/unit

Refrigerator Glass Door 15<V<30: $75/unit

Refrigerator Glass Door 30<V<50: $100/unit

Refrigerator Glass Door V=50: $125/unit

Air Compressors & Motors

Air Compressors:

$194.50 (kW savings) + $0.0750 (kWh savings)

Motors, VFD (Pumps/Fans):

$244.92 (kW savings) + $0.0754 (kWh savings)

Renewable Energy

Solar PV:

$450.00 (kW savings) + $0.3500 (kWh savings)

Solar Water Heating:

$244.92 (kW savings) + $0.0754 (kWh savings)

Wind Generation:

$179.00 (kW savings) + $0.0501 (kWh savings)

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CLEAResult Consulting, Inc. administers SWEPCO's Arkansas gridSMART initiative as an independent consultant.

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SWEPCO's Commercial Energy Efficiency Programs

Lighting Technology Lunch & Learn

Event Details

Date:
Wednesday, Oct 14

Time:
11:00 AM-1:00 PM

Location:
Mermaids Seafood Restaurant
217 N College Ave
Fayetteville, AR 72703

RSVP

Lunch will be provided!
Contact Shannon Joyce at 479-439-0294 or shannon.joyce@clearesult.com by **October 7** to reserve a seat.

Lunch is on us!

Join SWEPCO for an opportunity to learn about the newest in lighting innovations for energy efficiency projects. This educational session will focus on LED technology, controls, and appropriate lighting design.

Guest Speaker: **Kyle Hemmi, LC, LEED AP, CEM, CDSP**
Senior Energy Engineer at CLEAResult

Kyle Hemmi provides technical leadership and support for lighting energy efficiency projects and programs throughout North America. He brings more than 19 years of lighting and controls experience to the position, with an emphasis on specification, design, evaluation, and measurement and verification (M&V) in lighting efficiency projects and programs. Kyle has delivered presentations and training to more than 9,000 professionals on a variety of specialized topics like LED product performance and standards, residential lighting solutions, lighting economics, lighting controls, and C&I building automation. He serves as a technical advisor on the DesignLights Consortium's Technical Steering Committee and on NEEP's Commercial Advanced Lighting Controls project, and has held several leadership roles and committee positions within the Illuminating Engineering Society.

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The Energy Wave

Commercial Newsletter from SWEPCO's gridSMART Initiative

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FROM THE PROGRAM MANAGER

We've successfully launched another program year. Thank you to those who were instrumental in helping SWEPCO achieve its 2014 portfolio goal!

Similar to 2014, the commercial and industrial program team continues to enhance the contractor network, introduce new measures to the program, and utilize various forms of media for program advertising. During 2015, you can expect to see our comprehensive HVAC tune-up pilot program expanded to all SWEPCO commercial customers.

It's never a dull moment participating in these programs. LED prices are dropping rapidly while efficacy increases; more customers are requesting assistance on projects; and new construction appears to be ramping up in SWEPCO territory. We look forward to our continued partnership with active trade allies for an exciting 2015.

Best regards,
Ryan Parrish
Commercial & Industrial Program Manager
SWEPCO's gridSMART Initiative

Program News

Our Commercial and Industrial program remains the same trusty program you have experienced in previous years. We will be employing various marketing tactics, revamping program materials, and refreshing the SWEPCO gridSMART website.

Utilizing program experience and feedback from trade allies, we are expanding and enhancing our Small Business Direct Install program in 2015. Some of the immediate changes include:

- Incentive change from $0.14/kWh to $0.16/kWh
- Open 3.0 Release - January 2015
  - Improved project submission speeds
  - Improved project submission success rates
  - Ability to include two area types on one project
- New measure additions

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- Novelty cooler shutoff controls
- Evaporative fan controls (refrigeration application)
- Compressor point of sale incentives for 75 hp and below
- CoolSaver A/C tune-up

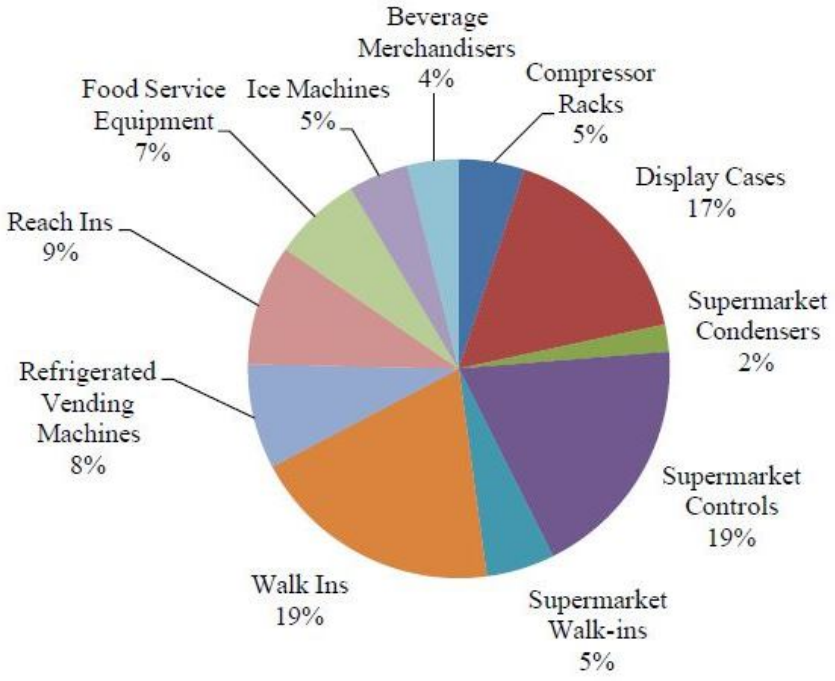
Energy Efficiency Measure Highlight

Refrigeration

Don't worry, this section of the newsletter will contain no puns about how "cool" energy savings can be or that energy savings can thaw a frozen bottom line. Instead, we wanted to present a few facts that should offer more insight as to why SWEPCO is interested in expanding our refrigeration offerings and projects.

Grocery stores and convenience stores are some of the most energy-intensive commercial buildings. Refrigeration accounts for approximately half of a grocery store's total electric load. Typical grocery stores with 40,000 sq ft - 60,000 sq ft of sales area consume approximately 2 - 3 million kWh annually for total store energy use.[1]

The chart below shows the annual potential primary energy savings from commercially available technologies.[2]



As you can see, kWh savings are waiting to be grabbed in the convenience store and grocery markets.

1. Oak Ridge National Laboratory. (2015 March). *Advances in Supermarket Refrigeration Systems* http://www.arb.ca.gov/cc/commref/adv_supmkt_ref_syst.pdf

2. Navigant Consulting Inc. (2015 March). *Energy Savings Potential and R&D Opportunities for Commercial Refrigeration* http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/commercial_refrig_report_10-09.pdf

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News & Events

- Q2 CoolSaver A/C tune-up contractor training event - date forthcoming
- Q2 Northwest Arkansas lunch and learn - date and subject forthcoming

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Commercial & Industrial Newsletter from SWEPCO's gridSMART Initiative

July 2015 - In This Issue

Program News

Energy Efficiency Measure Highlight

Marketing Corner

Contact Us

SWEPCOgridSMART.com

info@SWEPCOgridSMART.com

888-266-3130

FROM THE PROGRAM MANAGER

Summer has arrived. Anticipating the warmer months, the team has been busy expanding HVAC offerings and promoting HVAC efficiency with customers. Our comprehensive A/C tune-up pilot program has officially launched. All SWEPCO commercial customers are now eligible for this measure. The CoolSaver tune-up utilizes Bluetooth enabled gauges, proprietary algorithms, a tablet, and a data interchange. This setup aids our qualified contractors to provide the best feasible tune-up, troubleshoot under-performing units, and electronically submit the project for incentive payment.

Thank you to our trade allies who are actively participating in our programs. By working together, we are beginning to see market transformation occurring. To date, we have paid over $1,000,000 in incentives for our large commercial program projects and $200,000 to help small business owners. Additionally, we have already achieved over half of our 2015 energy savings goal in our large commercial program. This could be a leading indicator that the programs are changing how SWEPCO customers view and plan for energy efficiency projects.

Best Regards,

Ryan Parrish
Commercial & Industrial Program Manager
SWEPCO's gridSMART Initiative

Program News

The Program staff is staying busy with project management, contractor training, and responding to customer inquiries. Nonetheless, we are still planning outreach events to reach community allies and professional societies. Additionally, we are looking to future program years and planning new measures and program changes.

If you are part of a professional organization that you feel would benefit from an informational session or presentation about our commercial energy efficiency programs, please **contact us** with your request.

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Energy Efficiency Highlight-HVAC

- Install programmable thermostats
  - A programmable thermostat allows for users to optimize the temperatures within their facility and thus reduce the runtime of their HVAC unit. Room temperature set points can be scheduled to increase during the summer (or decrease during the winter) when the space is unoccupied. This prevents the HVAC unit from having to work as hard to maintain a comfortable space temperature when it is not required and in turn saves energy.

- Preventative maintenance on HVAC system equipment
  - Change the air filter on a regular basis
  - Have a qualified contractor "tune-up" your system
    - Clean evaporator and condensing coils
    - Clean and adjust blower components
    - Check refrigerant level

- Cleaning the different components of the HVAC system is a crucial part of preventative maintenance. A clean air filter will prevent dirt and debris from passing onto the evaporator coil and will also reduce the load on the blower. A clean evaporator and condensing coil will allow for better airflow and heat transfer which increase the overall efficiency of the system and reduce energy usage.

- Ensure that ductwork is properly connected and sealed
  - Leaky ductwork refers to conditioned air which is being lost to an undesired location due to holes in ductwork or poorly connected ductwork. Sealing and insulating ductwork will not only improve the indoor air quality and comfort of the conditioned spaces within a facility, but it will also improve the efficiency of the HVAC system, which saves energy.

Marketing Corner

Have you seen the commercial program billboards? Centrally located on the 549 Loop in Texarkana, we are currently running a billboard to generate interest in HVAC tune-ups. Another billboard, which rotates ads among our commercial and residential programs, is located on I-49 in Springdale. We continue to work for you by marketing the commercial programs with diverse messaging including a direct email to commercial customers that went out on Monday, June 29 to publicize our LED upgrades.

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October 2015 - In This Issue

Program News

Energy Efficiency Measure Highlight

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888-266-3130

FROM THE PROGRAM MANAGER

As we close the 3rd quarter, I would like to once again thank our trade allies who have partnered with SWEPCO to make this a banner year. To date, we have paid over $1.5M in incentives for our large commercial program projects and nearly $600,000 to help small business owners. Additionally, we have already achieved over 70% of the large commercial program energy savings goal, and 80% of the small business program energy savings goal. During this time of year, we are busy inspecting projects, paying incentives to SWEPCO customers, and planning for the launch of another year. Despite everyone's full schedules, we would like to take the time to thank our trade allies in person. Be sure to watch for a trade ally appreciation luncheon invitation. We will be holding a luncheon in Texarkana and Northwest Arkansas in early December. Details are soon to follow.

Best Regards,

Ryan Parrish
Commercial & Industrial Program Manager
SWEPCO's gridSMART Initiative

Program News

Planning for the 2016 program year is underway and we are seeking your feedback. Some program enhancements under consideration are:

- Streamlining inspection processes for smaller projects
- Adding retro commissioning incentives
- Adding more refrigeration measures such as gaskets and strip curtains
- Adding a deemed savings approach (no measurements required) for VFD applications such as air handlers

Additionally, if you are part of a professional organization that you feel would benefit from an informational session or presentation about SWEPCO's commercial and industrial energy efficiency programs, please contact us to submit your request.

Year-to-Date Market Information

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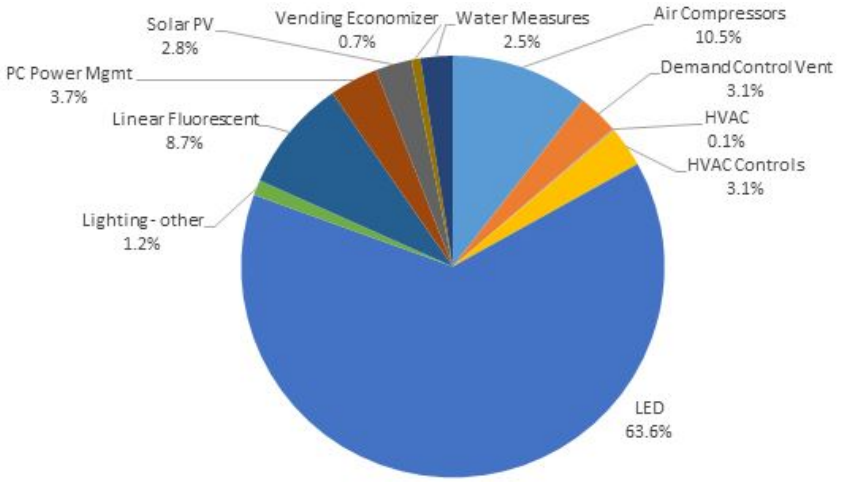
Another benefit we would like to extend to our trade ally network is providing market information on completed projects. The hope is that this information will prove to be useful as you consider how best to position your company resources.

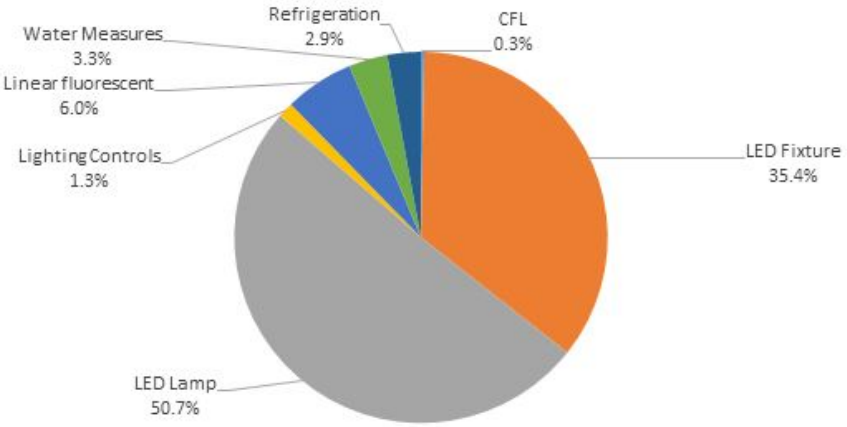
Large Commercial and Industrial Program

Projects completed YTD have been predominately lighting; however, it is expected that this measure mix will change by end of the year with the completion of several large, industrial systems projects.



Small Business Program

The following graphs show the YTD projects by measure and by city.



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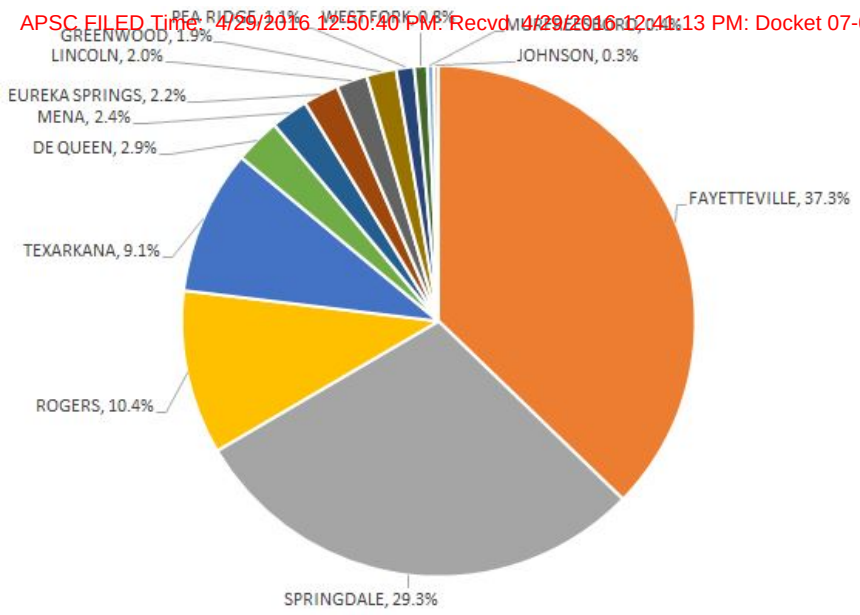

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SWEPCO Commercial Energy Efficiency Programs

Event details

Meeting Option 1

Date:
Tuesday, March 24

Time:
8:00 AM-10:00 AM

Location:
Maud Cobb Convention Center
100 Grand Blvd
Longview, TX 75604

Meeting Option 2

Date:
Wednesday, March 25

Time:
8:00 AM-10:00 AM

Location:
Texarkana Convention Center
2910 Cowhorn Creek
Texarkana, TX 75503

Register now

Breakfast provided! Email **Elisha Pratt** or call 318-861-8430 x3031 to RSVP.

Join us for breakfast!

Please join us for a breakfast informational session about LED lighting. We will provide technical training for SWEPCO Arkansas and Texas customers and trade allies. In addition, an overview of best practices and applications of new technologies that are available in the marketplace will be provided.

We will be conducting this event in both Longview, TX and Texarkana, TX. Please review the dates, times, and locations carefully and include your preferred date and location in your RSVP to Elisha Pratt.

Please RSVP by Monday, March 23.

Did You Know?

- LED fixtures will only qualify if they are ENERGY STAR® rated, or listed on the Design Lights Consortium
- Energy efficiency programs in Texas no longer pay incentives for standard T-8 lighting retrofits

Due to recent changes by the Public Utility Commission of Texas (PUCT), specific lighting technologies will be required to be installed in both new construction and retrofit projects in order to qualify for SWEPCO incentives. These rule changes have taken effect and a thorough understanding of these new requirements is essential to securing incentives for your projects.

SWEPCO is committed to educating participating contractors and customers on the newest technologies.

Feel free to include guests on your RSVP, or forward this email for registration.

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Saving is simple with SWEPCO

Energy efficiency rebates aren't just for homes and businesses.
Discover how our programs help local government buildings, too.

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Older lighting.

Makes no cents.

AEP SOUTHWESTERN ELECTRIC POWER COMPANY™

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Brighten up the bottom line.

Finally, a simple lighting solution that also improves your bottom line. Will you give it the green light?

With SWEPCO's help, upgrading to LED lighting can help you save energy month after month. And SWEPCO's incentives can improve your bottom line instantly. This year's incentive funds are already going fast—opportunity knocks for a limited time.

Benefits of an LED lighting upgrade include:

- Longer-lasting lights.
- Superior light quality.
- Lighting control compatible.

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Contact Shannon Joyce at **479-439-0294** for more information.

SWEPCOgridSMART.com
info@SWEPCOgridSMART.com

Commercial - Q1 Billboard

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Older lighting. Makes no cents.

SOUTHWESTERN ELECTRIC POWER COMPANY
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LEDs are first at lasting.
In this business climate, easy ways to improve your bottom line are worth a look. That's why upgrading your old lighting makes sense, and this year's limited-time incentives from SWEPCO really brighten the deal. Benefits of an LED lighting upgrade include:

- Longer-lasting lights.
- Superior light quality.
- Lighting control compatible.

Now is the time to upgrade to longer-lasting lights that boost your bottom line. And since SWEPCO's incentive funds are going fast, opportunity is knocking for a limited time only. Are you ready to save?

Contact Shannon Joyce at **479-439-0294** for more information.

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Commercial - Q2 Billboard

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Longer Lasting. Bright Ideas.

SOUTHWESTERN ELECTRIC POWER COMPANY
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LEDs are the new standard for "that was easy."

With so many products on the market today, it's hard to know "helpful" from "hype". But a simple upgrade that delivers impactful savings and boosts your bottom line is worth a second look. LED upgrades deliver those long-term results, and through SWEPCO you can receive incentives to offset the initial cost of upgrading.

Benefits of an LED upgrade include:

- Longer-lasting lights
- Excellent light quality
- Lighting control compatible

There's never been a better time to choose energy-efficient lighting. Discover what LEDs can do for your bottom line.

Our energy advisors or participating contractors are available to conduct a free, no obligation site assessment and can help identify lighting projects that fit your energy-saving goals. Contact our Call Center at **888-266-3130** for more information.

All LEDs are required to be either ENERGY STAR® or DLC listed.

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Commercial & Industrial Energy Efficiency Program Manual

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Revised: January 2014

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Commercial & Industrial Energy Efficiency Program Manual

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Section 1: Introduction

This program manual outlines the policies and procedures for Southwestern Electric Power Company's (SWEPCO) Commercial & Industrial Energy Efficiency Program (CIEEP) and is intended to guide "implementation and participation" activities, making certain all parties understand the program requirements and their responsibilities. The manual is designed for use by SWEPCO personnel, its customers and participating contractors. SWEPCO has contracted with CLEAResult Consulting, Inc. to assist with program implementation.

1.1 Program Overview

The CIEEP is an energy efficiency program targeted to Arkansas Commercial and Industrial customers served by AEP SWEPCO. Monetary incentives will be paid to Project Sponsors for the retrofit installation of a wide range of measures that reduce demand and save energy in non-residential facilities.

Participants in the CIEEP must meet minimum eligibility criteria, comply with all program rules and procedures, submit documentation describing their projects, and enter into a CIEEP Agreement with AEP SWEPCO. This document summarizes eligibility requirements, incentives, the participation process, and other information needed to successfully take part in this program.

Section 2: Eligibility Requirements

2.1 Project Sponsor

A program participant (Project Sponsor) must install eligible measures at a SWEPCO served non-residential customer facility. Eligible Project Sponsors may include:

- National or local energy service companies (ESCOs)
- Local contractors
- National or local companies that provide energy-related services or products (such as lighting or HVAC equipment)
- Individual customers that install measures in their own facilities
- Cities/Counties/Local Governments

To ensure that the program's incentive budget is allocated to projects that are likely to meet with success, all Project Sponsors will be required to demonstrate a commitment to fulfilling program objectives and competency in completing the proposed project. Project Sponsors will be required to submit the Project Application / Customer Agreement.

To ensure that incentives are available to multiple participants, SWEPCO reserves the right to review individual projects to maximize incentive levels for the project while ensuring incentives are available for other customers.

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2.2 Host Customer

Any Arkansas commercial and industrial SWEPCO customer who owns or operates a site may host a project developed by a qualified Project Sponsor or choose to sponsor the project independently. The host customer's responsibilities include the following:

- Committing to an energy efficiency project
- Entering into an agreement with the selected Project Sponsor (or SWEPCO for customer-sponsored projects)
- Providing reasonable access to project facilities both before and after project completion

2.3 Project

A project is defined by the set of measures at an eligible SWEPCO - served non-residential customer site and the estimated demand and energy savings included in a single application. All projects must meet the following requirements:

- If the customers and sites proposed are all similar, one project may involve the installation of measures at multiple customer sites. For example, installation of measures at a chain of grocery stores may include more than one customer, but may constitute a single project. This limitation is included to limit administrative costs for due-diligence review of applications and projects.

Projects that include a comprehensive range of measure types are especially encouraged.

2.4 Measure

Most energy efficiency measures in retrofit applications that reduce electric energy consumption and summer daytime peak demand are eligible for the CIEEP. SWEPCO does not specify eligible measures in order to provide Project Sponsors maximum flexibility in packaging services. Therefore, Project Sponsors may propose the inclusion of any measure that:

- Produces a measurable and verifiable electric demand reduction during the peak summer period (defined as weekdays, between the hours of 1 p.m. and 7 p.m. from May 1 until September 30, excluding holidays) and produces electric energy savings
- Produces savings through an increase in energy efficiency or a substitution of a renewable energy source for electricity supplied through the transmission grid
- Is installed in a new or retrofit application
- Exceeds minimum equipment standards as provided in Arkansas TRM

Measure types *excluded* from consideration in the program are those that:

- Involve self-generation or cogeneration, except for renewable technologies
- Rely on changes in customer behavior and require no capital investment
- Result in negative environmental or health effects

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- Receive an incentive through any other energy efficiency program offered by SWEPCO
- Involve Thermal Energy Storage (TES)

Project incentives will be paid only for energy and demand savings directly related to end-use equipment installed under the project. Savings due to interactive effects between lighting and space-cooling measures will be eligible for payment based on a stipulated value only in cases where lighting measures have been installed in a conditioned space as part of the program. Interactive effects between other end-use equipment will not be eligible for program payments.

Table 1 provides examples of eligible and ineligible measures. SWEPCO may consider any measures that are not listed in Table 1 for program eligibility on a case-by-case basis.

Table 1 - Examples of Eligible and Ineligible Measures and Projects

ELIGIBLE MEASURES	INELIGIBLE MEASURES
Commercial Cooling and Ventilation Measures/Projects	
▪ Constant air volume to variable air volume conversion projects	▪ Cogeneration and self-generation projects, except renewable technologies
▪ Chiller replacement projects	▪ Thermal energy storage projects
▪ Packaged cooling unit replacement projects	▪ Load reductions caused by building vacancies, decreased production, or other changes in occupant characteristics or behavior
▪ Air-side or water-side economizer projects	▪ Measures that require no capital investment
▪ Fan and pump variable-speed drive installations	▪ Measures for which EE incentives were received under another SWEPCO program
Commercial Lighting Measures/Projects	▪ Energy-efficient gas-only measures
▪ High-efficiency fluorescent lighting and approved LEDs that replace less efficient lighting	
• Lighting controls to reduce operating hours	
Refrigeration Measures/Projects	
▪ Air cooling and refrigeration compressor replacement projects ▪ Anti-sweat heater controls	
Industrial Measures/Projects	
• Variable speed drive installations on industrial fans and pumps	

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• Compressed Air System upgrades	
• Custom Measures – case-by-case	

2.5 Efficiency Standards

SWEPCO has designed the CIEEP to encourage electric energy efficiency improvements that go above and beyond the efficiency gains typically achieved in retrofit or replacement projects. Consequently, energy and demand savings credit will be based only on reductions that exceed current state and federal minimum efficiency standards, if such standards apply. In cases where standards do not exist, savings credit will be based on improvements relative to a customer's energy use prior to participating in the program. A list of federal and state equipment efficiency standards is provided in the Arkansas TRM.

Section 3: Incentives

SWEPCO will provide monetary incentives to encourage Project Sponsors to implement EE projects recommended by the program. The Project Sponsor described above will first execute the necessary contract agreements with SWEPCO for each project, implement a qualifying project, and complete the project as described in the Project Sponsor application. The incentive prices and payments are summarized below.

3.1 Incentive Rates

The CIEEP provides standard incentive rates for demand savings and for first-year energy saved as a result of the measures installed.

Demand savings will be calculated as the maximum, one-hour average demand reduction that occurs when the system undergoing retrofit is operating at peak conditions during the summer period. Energy savings are defined as energy savings over the course of one 12-month period.

Savings will be either "deemed"—that is, stipulated through standardized savings values or formulas—or estimated through measurement and verification.

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Table 2: Incentive Rates

Measure Name	Incentive ($/kW)	Incentive ($/kWh)
Air Compressors	$ 194.50	$ 0.0750
Chillers	$ 288.60	$ 0.0888
Freezer Glass Door 0 < V < 15	$50/unit	
Freezer Glass Door 15 < V < 30	$75/unit	
Freezer Glass Door 30 < V < 50	$100/unit	
Freezer Glass Door V = 50	$125/unit	
Geothermal	$ 321.10	$ 0.0988
HVAC (DX, split, packaged)	$ 244.92	$ 0.0754
Lighting Controls	$20/unit	
Lighting Screw-In CFL (11W to 40W)	$2/unit	
Lighting Screw-In CFL (41W to 200W)	$4/unit	
Lighting Linear Fluorescent Fixtures	$ 175.00	$ 0.0650
Lighting Modular Fluorescent Fixtures	$ 175.00	$ 0.0650
LED Fixture Lighting	$ 220.00	$ 0.1200
LED Recessed Down Light Fixture*	$25.00/unit	
LED 5W to 25W Screw-In Replacement*	$10.00/unit	
LED 1W to 4W Screw-In Replacement*	$5.00/unit	
LED Exit Signs	$10.00/unit	
Motors, VFD (Pumps/Fans)	$ 244.92	$ 0.0754
Refrigerator Glass Door 0 < V < 15	$50/unit	
Refrigerator Glass Door 15 < V < 30	$75/unit	
Refrigerator Glass Door 30 < V < 50	$100/unit	
Refrigerator Glass Door V = 50	$125/unit	
Solar PV	$ 450.00	$ 0.3500
Solar Water Heating	$ 244.92	$ 0.0754
Wind Generation	$ 179.00	$ 0.0501
Anti-Sweat Heater Controls – Medium Temperature Application	$29.50 / controlled linear foot	
Anti-Sweat Heater Controls – Low Temperature Application	$68.50 / controlled linear foot	
Demand Control Ventilation – commercial hoods	$ 0.00	$0.13
PC Power Management Software	$0.00	$0.10

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Other	Case By Case Basis

** Must be DesignLights Consortium or ENERGY STAR® approved*

3.1.2 Direct Install Measures

Direct Install Measures are measures provided at no cost to the customer. Both the material and labor required to complete installation of these measures are provided by the implementation team to the SWEPCO customer. These measures include:

- Low Flow Aerators
- Low Flow Pre-Rinse Spray Valves
- Vending Economizers – only applicable for beverage machines and non-ENERGY STAR® labeled machines
- 13W CFL replacements of incandescent bulbs
    - Quantity restrictions apply.
        - 30 lamps are eligible for replacement
        - 50% of the remaining lamps are eligible for replacement

3.2 Limitation – Maximum Project Sponsor Incentives

To ensure that incentives are available to multiple participants, SWEPCO reserves the right to review individual projects to maximize incentive levels for the project while ensuring incentives are available for other customers.

Incentives are limited to 80% of the total project cost.

3.3 Payments

SWEPCO will pay the Project Sponsors in one or two installments depending on the measures involved in the project. For those measures with savings that are *estimates* and require post-installation measurement and verification (M&V), the Project Sponsor may receive an initial payment equal to 40% of the approved incentive reservation amount, which is documented in the Final Project Application, after the project is installed and approved by SWEPCO.

For measures with deemed savings values, the Project Sponsor will receive a payment equal to 100% of the approved incentive payment after a project is installed and approved by SWEPCO. Therefore, the total “installation payment” is determined by

1. Calculating the portion represented by those measures with estimated savings (the "estimated installation payment") using the following equation:

    Estimated installation payment =
    0.4 * [(estimated peak demand kW savings * $/kW incentive rate) + (estimated annual kWh savings * $/kWh incentive rate)]

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2. Calculating the portion represented by those measures with deemed savings values (the "deemed installation payment") using the following equation:

   Deemed installation payment =
   (deemed peak demand kW savings * $/kW incentive rate) + (deemed annual kWh savings * $/kWh incentive rate)

3. Adding the estimated portion to the deemed portion to get the total installation payment:

   Installation payment = Estimated installation payment + Deemed installation payment

For non-deemed savings measures, all M&V activities must be complete, documented, and accepted by SWEPCO before the Project Sponsor will receive the remaining incentive payment based on the one-year verified savings. This “performance payment” will be equal to the actual savings minus the estimated installation payment and may be up to 60% of the total approved estimated incentive payment. Therefore, the performance payment will be calculated as follows:

Performance payment =
[(measured peak demand savings * $/kW incentive rate) + (measured annual energy savings * $/kWh incentive rate)] – estimated installation payment

The final project incentive payment will be in accordance with final M&V results.

For projects requiring detailed M&V plans, the M&V plan must be agreed to by both the customer and the implementation team prior to beginning.

In the event that M&V activities reveal that the total savings are less than the Installation Payment, the Project Sponsor is responsible for payment of the difference between the Installation Payment and eligible incentives to SWEPCO.

Section 4: Participation Process

The Project Sponsor participation process is as follows.

Step	Core Participation Pathway	Optional Services *
1	**Site Visit**	
	The Energy Advisor reviews the Program's services, incentives, and value of participation with the customer. At this time, the optional walk-thru assessment is discussed and scheduled with customer if requested.	• Walk-thru Assessment
2	**Project Identification**	
	The customer and Energy Advisor identify a project that may be eligible for the Program and prepare an Initial Application. If requested, the Energy Advisor will provide assistance conducting financial analysis necessary to justify the project.	• Financial analysis

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3	**Initial Application** (May not be required. Contact Energy Advisor**)**	
	The customer submits the completed Initial Application that outlines the potential project, savings, and incentive request. The Energy Advisor verifies the proposed project is eligible for incentives and determines M&V requirements.	
4	**Bid Process**	
	The customer obtains bids for the desired project. If requested, the Energy Advisor will provide assistance developing the specifications for the project and conducting the financial analysis necessary to justify the project.	• Product specification development • Financial analysis
5	**Pre-Installation Inspection**	
	The Energy Advisor conducts a pre inspection to verify existing conditions and equipment.	
6	**Final Application**	
	The customer submits a Final Application that outlines the final project specifications, estimated savings, and incentive reservation amount. The Energy Advisor verifies the final project is eligible for incentives and determines M&V requirements.	• Project Application assistance
7	**Installation**	
	The customer selects a contractor and installs the eligible measures.	
8	**Post Installation Inspection**	
	The Energy Advisor conducts the necessary post inspections to verify upgrades.	
9	**Measurement and Verification (M&V)**	
	The customer and their contractor conduct any necessary M&V. If using deemed savings, the Energy Advisor will calculate the final savings based on the post installation inspection.	
10	**Project Close Out**	

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	The Energy Advisor submits final project documentation and initiates incentive payment process. Customer receives incentive within 2 – 4 weeks.	• Press release • Check presentations

**** Note:** customers can skip to step 5 if they already have identified a project and do not need technical assistance or guidance.

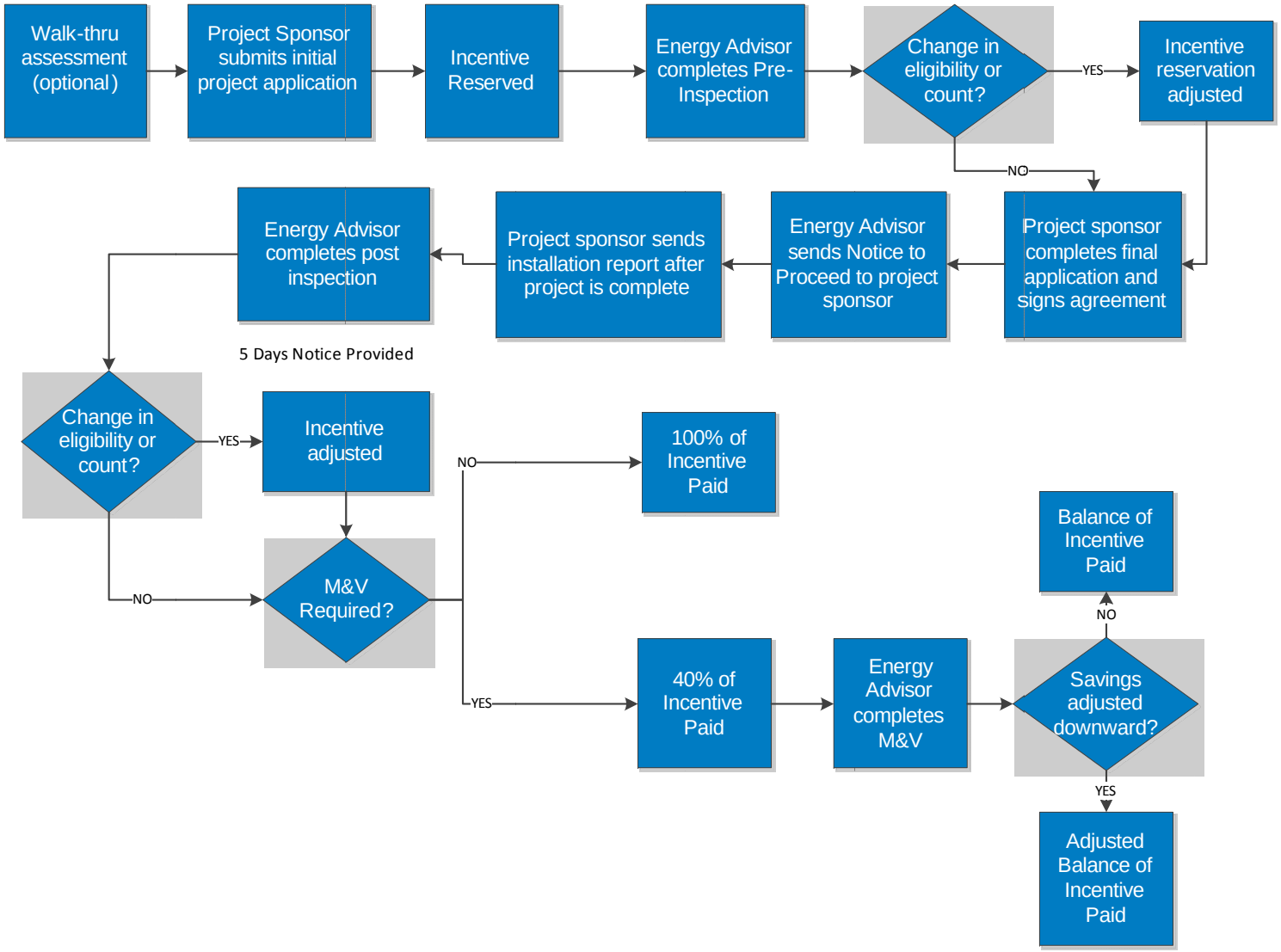

Figure 1 – Participation Process Diagram

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4.1 Initial Application

Project Sponsors begin the Initial Application (IA) process by downloading and submitting the IA from www.swepcogridsmart.com. The Initial Application shall contain the following information:

- Identification of the Project Sponsor.
- Identification of the host SWEPCO customer site(s).
- Description of the proposed set of energy-efficiency measures and associated incentives requested.
- Brief work plan for project design, implementation, operation, and management, including the anticipated project timeline.

Initial Applications will be reviewed on a first-come, first-served basis until all incentive funding has been committed. Once SWEPCO has provided feedback on the Initial Application and reserved funding for the project, the Project Sponsor may proceed refining project scope. This information will be submitted in the Final Application phase. A typical review cycle for Final Applications is 5 business days.

4.2 Pre-Installation Inspection

SWEPCO will conduct a pre-installation inspection of the project site or plans to verify the baseline conditions documented in the application and the feasibility of installing the proposed equipment. The pre-installation inspection requires the presence of at least one representative of the Project Sponsor familiar with the project and the facility so that any discrepancies can be identified simultaneously by all parties. The inspection will verify the following information:

- The accuracy of the equipment survey. For most measures the accuracy of the equipment quantity and nameplate information is verified.
- The M&V plan is appropriate for the measure, and the necessary M&V activities are being performed.
- All existing equipment listed in the Final Application is still in place and operational.
- New equipment installation, or preparation for installation, has not begun.

When electrical measurements are necessary, the representative(s) is required to perform any necessary disruptions in equipment operation, the opening of any electrical connection boxes, or the connection of current and power transducers. If the pre-installation inspection cannot be completed in a timely manner because the representative(s) is unfamiliar with the facility or project, the project site will fail the inspection.

If a project site fails two inspections, SWEPCO will reject the project and release the reserved incentive funds.

If the proposed equipment has been installed before the pre-installation inspection and the baseline conditions cannot be verified, SWEPCO may reject the Final Application, and release the reserved incentive funds.

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4.3 Final Application

Project Sponsors must complete a Final Application (FA) to participate in the program. This application will include or be accompanied by the following information, submitted by the Project Sponsor:

- Detailed information about the host customer site(s) and customer contact information.
- Full description of the existing and proposed equipment, including equipment counts, equipment efficiencies, and equipment nameplate data.
- Building occupancy and equipment operating schedules.
- Engineering calculations estimating energy and demand savings based on the efficiency of the proposed equipment compared to that of new, minimum-standard efficiency equipment.
- If required, a project-specific M&V plan describing how the sponsor will monitor and verify energy and demand savings, the methods for calculating actual savings, and a schedule for conducting and reporting on M&V activities. In some cases, pre-installation M&V activities may be required to accurately estimate savings. Revised work plan for project design, implementation, operation, and management, including the anticipated project timeline.
- A signed Project Sponsor and Customer Agreement.

SWEPCO may also review the feasibility of the proposed measures, the accuracy of the savings estimates, and the comprehensiveness of the M&V plan. SWEPCO may request clarification of or additional information about any item in the application. Project Sponsors will have ten working days to respond to such requests. If the clarification or additional information is not forthcoming, SWEPCO may choose to discontinue its evaluation of the application. If the project is approved, SWEPCO will reserve the appropriate amount of incentive funds for the project and prepare a CIEEP Agreement.

The Project Sponsor is required to sign the contract with SWEPCO before installing any measures. The terms of the contract will be standard for all Project Sponsors, and will include the measures to be installed, estimates of demand and energy savings, a maximum incentive payment associated with the project, and the approved M&V approach

4.5 Installation Notification

After all energy efficiency measures, as outlined in the FA have been installed, the Project Sponsor must notify SWEPCO or the implementation team within 10 business days. This will prompt a post inspection of the facility, which is the beginning of the incentive fulfillment process.

At the time of installation notification the Project Sponsor shall submit the following:

- W-9 for payment processing purposes
- Project invoices (both labor and material) for the purpose of incentive cap check and cost effectiveness calculations

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4.6 Post-Installation Inspection

SWEPCO will contact the Project Sponsor and conduct a post-installation inspection of the project site within after the receipt of Installation Notification. The post-installation inspection requires the presence of at least one representative of the Project Sponsor familiar with the project and the facility. The inspection shall verify that:

- The equipment specified in the CIEEP Agreement has been installed and is operating as described in the approved Final Application. For most measures the accuracy of the equipment quantity and nameplate information is verified.
- The M&V plan is being followed in accordance with the approved Final Application.

When electrical measurements are necessary, the representative(s) is required to perform any necessary disruptions in equipment operation, the opening of any electrical connection boxes, or the connection of current and power transducers. If the post-installation inspection cannot be completed in a timely manner because the representative(s) is unfamiliar with the facility or project, the project site will fail the inspection.

4.7 Measurement and Verification

Before the total incentive payment is made, the potential for the project measures to save demand and energy must be verified and the actual savings estimated. These activities will be conducted in accordance with the M&V plan developed for the project. Project Sponsors are responsible for developing their own M&V plans conducting all M&V activities for the project.

M&V procedures will vary in detail and rigor depending on the measures installed. For each installed measure, the chosen procedures will depend upon the predictability of equipment operation, the availability of evaluation data from previous programs, and the benefits of the chosen M&V approach relative to its cost.

Project-specific M&V procedures may be classified according to three distinct approaches that represent increasing levels of detail and rigor.

- **Deemed savings:** Savings values are stipulated based on engineering calculations using typical equipment characteristics and operating schedules developed for particular applications, without on-site testing or metering. This approach can be used only for measures for which savings are relatively certain, such as lighting efficiency and controls.
- **Simple M&V:** Savings values are based on engineering calculations using typical equipment characteristics and operating schedules developed for particular applications, with some short-term testing or simple long-term metering. For example, chiller energy and demand savings can be determined using the simple approach by comparing rated efficiencies of high-efficiency equipment to standard equipment, and using kW spot-metering and simple long-term kWh metering.
- **Full M&V:** Savings are estimated using a higher level of rigor than in the deemed savings or simple M&V approaches through the application of metering, billing analysis, or computer

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simulation. These methods will need to be developed in accordance with the 2010 International Performance Measurement and Verification Protocol (IPMVP), which represents the starting point for standard industry practice. More information about the IPMVP may be found on the Internet at www.ipmvp.org. Using the IPMVP as a guide, SWEPCO has developed several measure-specific guidelines to help ensure consistency and quality of the M&V performed by Project Sponsors. Project Sponsors will need only to adapt the guidelines to their specific projects in order to specify a project-specific M&V plan for the application stage.

The time required to complete M&V activities will range from less than a month to up to 12 months, depending on the approach chosen. Refer to the M&V section of this manual for details regarding the M&V guidelines for the program.

4.8 M&V Report

After all M&V activities are complete, SWEPCO's Energy Advisor will complete an M&V Report documenting the projects measured demand and energy savings. An approved M&V Report will serve as the invoice for the final incentive payment – the performance payment. This payment is based on the project's verified savings minus the amount paid in the installation payment.

Section 5: Correspondence

All applications will be completed and submitted to SWEPCO. All supporting documentation will be submitted to the appropriate SWEPCO EE/Consumer Programs Coordinator listed below.

All correspondence and documentation for the CIEEP in AEP SWEPCO's Arkansas service territory should be directed to the address below:

AEP SWEPCO
Attn: Greg Perkins, EE/Consumer Programs Coordinator
101 W. Township
Fayetteville, AR 72703
Phone: (479) 973-2435
E-mail: gaperkins@AEP.com

Section 6: Confidentiality

The CIEEP is subject to oversight by the Arkansas Public Services Commission, which may request a copy of any program materials received by SWEPCO. Sensitive company and project information, such as financial statements, should be identified as "confidential" when submitted to SWEPCO. These materials will be treated confidentially, and will not be provided directly to outside parties other than the APSC. SWEPCO will have no liability to any Project Sponsor or other party as a result of public disclosure of any submittals.

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Section 7: Participation Costs

SWEPCO will not reimburse any Project Sponsor for any costs incurred by participating in the CIEEP, including costs of preparing the Final Application or reviewing the CIEEP Agreement.

Section 8: Submission of False Information

SWEPCO reserves the right to discontinue its evaluation of all submittals from any Project Sponsor who, in the sole judgment of SWEPCO, submits false, misleading, or incorrect information.

Section 9: Web Site

The CIEEP web site at http://www.swepcogridsmart.com will serve as the primary source for all updated program information and materials. The web site will include the following:

- Information that describes the program design and requirements
- Contact information to receive more information about the program
- A list of frequently-asked questions (FAQ) about the program
- Status updates on program funding available and committed
- Downloadable guidelines, applications, and submittal forms

Section 10: Equipment and Installation Standards

Baseline equipment standards are in accordance with the latest, governing version of the Arkansas Technical Resource Manual, ASHRAE 90.1, and/or IECC standards.

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SWEPCO Commercial & Industrial Energy Efficiency Programs

Event details

Date:
Friday, June 12

Time:
11:30 AM-1:00 PM

Location:
Fayetteville Chamber of Commerce
123 W Mountain St
Fayetteville, AR 72701

Register now

Lunch provided!
Email **Shannon Joyce** or call 479-439-0294 to RSVP.

Join us for lunch!

The temperature is rising and your HVAC is revving up. You are invited to an HVAC Lunch & Learn sponsored by SWEPCO's Energy Efficiency Programs. Come and learn about incentive money available through the CoolSaver℠ A/C Tune-up measure offered to SWEPCO's Commercial and Industrial customers.

You will learn about:

- Incentives for CoolSaver A/C Tune-ups
- Improving comfort of building occupants
- Optimizing building energy usage
- Managing the operation of building systems

Space is limited!

RSVP by Tuesday, June 9.

Feel free to include guests on your RSVP, or forward this email for registration.

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AEP SOUTHWESTERN ELECTRIC POWER COMPANY℠

A unit of American Electric Power

Small Business Direct Install Program Manual 2015

Updated January 7, 2015

SWEPCOgridSMART.com

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From Southwestern Electric Power Company

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Program Overview

Program Description

SWEPCO has selected CLEAResult (Implementer) to serve as the program implementer for its Arkansas Small Business Direct Install (SBDI) Program. The Implementer will conduct outreach to potential participating contractors who provide services to customers who are served by SWEPCO for this program.

SBDI is a market transformation program designed to offer contractor and customer education on energy efficiency technologies, equip participating contractors with the tools they need to succeed in generating revenue from projects in the small business market, and offer substantial incentive rates needed to move small businesses (50 kW and less) to install energy efficient products such as high efficiency lighting and refrigeration measures. The program overcomes market barriers by providing incentives to help pay for energy efficiency upgrades. In addition, SBDI connects customers with participating contractors that are qualified to provide design and installation services for energy efficient technologies, and give customers any additional technical support to make them comfortable with the implementation of efficiency measures in their facilities.

The program design is a contractor direct install model enabling market transformation at the contractor and customer level. The program is based on contractor engagement and furthermore provides a Proposal Generation Software Application (Proposal App) to empower participating contractors and to streamline program participation. The participating contractor must use the Proposal App for all measures to participate in the program; no Customer Proposals for lighting measures will be accepted that were not generated by the Proposal App. The Proposal App will enable participating contractors to:

- Perform facility surveys for measures listed in the “Measure Eligibility” section
- Generate Customer Proposals which (upon program approval) reserves incentives for the projects
- Obtain electronic customer signature
- Submit Customer Proposal to reserve program funds
- Track project and incentive status

The program focuses on educating and training participating contractors to provide customer support and will provide direct customer assistance as needed.

The program is designed uniquely for the SWEPCO market. This is a program intended to introduce energy efficiency to SWEPCO customers while providing substantial economic benefits to them. This program uses an expedited, simple solution appropriate for engaging contractors and nonresidential customers in energy efficiency projects. The program targets cost-effective equipment retrofits that replace inefficient technologies with high efficiency relatively low cost technologies, allowing the program to reduce the project costs enough to engage small and very small business in energy efficiency project installation.

The program provides incentives using a performance based approach described in the section on Program Incentive Rates. Streamlined incentive application, and verification and quality

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control processes are employed to facilitate ease of participation and minimize the time required for incentive payment. The program also equips contractors to participate in the program so they can improve their business while being a resource to drive projects.

Program Goals

SBDI is a market transformation program devised to achieve peak demand and energy savings by providing qualified contractors the direct support, tools, and training necessary to drive energy efficiency among small businesses within the SWEPCO service territory. The SBDI program goal for 2015 is 500kW reduction in peak demand and 4,800,000kWh reduction in energy usage.

These goals will be met primarily through the installation of lighting, water heating, and refrigeration measures in SWEPCO's service territory, as well as other measures as appropriate for customer facilities. See Measure Eligibility section for a list of measures that are eligible for program incentives.

Participating Contractor Benefits

There are many benefits for contractors participating in the program including incentive levels that offer inroads into the small business sector, incentives that are paid directly to the contractor, training opportunities and free access on the Proposal App.

The Proposal App is a valuable software tool developed for use with this program which is currently configured to collect existing and new equipment information for lighting measures, collect an electronic customer signature and submit Customer Proposals electronically, and can be used by participating contactors to track the status of their projects and incentive payments. See Participating Contractor Eligibility for more information on how participating contractors can access the Proposal App.

Customer Benefits

The program seeks to help small business customers with high energy use by providing them with access to technical knowledge on energy assessments and financial incentives to improve the energy efficiency of their buildings. The program connects customers with participating contractors to provide assistance and perform lighting, refrigeration, and other energy efficiency installations. Participating contractors will work with each customer to identify their specific obstacles to adopting more energy efficient equipment or practices. Participating contractors will provide technical support to help customers identify and evaluate energy efficiency opportunities in order to determine which projects are viable. Participating contractors will also educate customers on energy efficient technologies and the technical criteria and non-technical considerations (aesthetics, maintenance impacts) to contemplate when selecting a product.

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Program Incentive Rates

Incentives are paid to contractors based upon the estimated energy savings resulting from qualified installations. The Program will pay $0.16/kWh reduced for customers with maximum peak demand of 50 kW and less up to 90% of the project cost.

Sector	Program Incentives	Limitations
≤ 50kW	$0.16/kWh reduced	Incentive ≤ 90% project cost
≤ 50kW	100% of cost	*Direct Install Measures Only

*Direct install measures include faucet aerators, pre-rinse spray valves, and vending economizers (certain beverage machines only).

Program Management and Contacts

The first contact for program information for participating contractors and customers is the Implementer:

Ryan Parrish
479.935.9060
ryan.parrish@clearesult.com

Program Dates

The program year runs from January 1, 2015 to December 18, 2015, or until the incentive budget is depleted.

- Program Year Start Date: January 1, 2015
- Project Completion Due Date: The program will pay the participating contractor for documented usage reduction produced from eligible energy efficiency measures that are completed no later than 60 days past the date of the signature on the Customer Proposal, or by November 30, 2015, whichever is earlier

Program Roles & Responsibilities

Program Sponsor (SWEPCO):

SWEPCO is responsible for

- Authorizing and issuing incentive payments for completed projects
- Selection and oversight of the Implementer

Implementer:

CLEAResult was selected by SWEPCO to serve as the Implementer for SBDI. The Implementer is responsible for:

- Conducting and/or assigning formal on-site pre- and post-installation inspections of eligible projects to approve kW and kWh savings and incentive amounts

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- Conducting outreach to potential participating contractors
- Educating customers and providing technical assistance including identification of energy efficiency projects
- Approving eligibility and enrollment for customers
- Reviewing and approving Customer Proposals
- Oversight and training of participating contractors

PARTICIPATING CONTRACTOR:

To participate in SWEPCO SDBI, participating contractors will be asked to fulfill the following Program requirements:

- Commit to the terms of the SBDI Participating Contractor Agreement
- Conduct a comprehensive facility survey with the Proposal App, or appropriate calculator
- Conduct facility surveys to identify energy efficiency projects that are eligible for incentives
- Educate customers and provide technical assistance including identification of energy efficiency opportunities
- Provide customers with Customer Proposals using the Proposal App, or appropriate calculator
- Document hot water heating type as “gas”, “electric”, or “no tank” within the tool and prior to project approval.
- Obtain signed Customer Proposals and submit them to the Implementer
- Schedule and conduct installations
- Provide installations at qualifying customer facilities in the SWEPCO service territory according to the Customer Proposal provided within 60 days of the date on the Customer Proposal
- Install products that comply with the Product Quality Requirements included in Appendix A
- Educate customers and provide technical assistance where needed during project installation
- Ensure excellent professional customer service for the facility survey and project installation
- Notify Implementer of project completion within 24 hours of installation
- Submit project invoice upon completion to Implementer
- Provide Implementer with feedback on the program

CUSTOMER OF PARTICIPATING CONTRACTOR:

Customers will be asked to:

- Sign the Customer Proposal and commit to installation in order to reserve incentives
- Provide documentation, including but not limited to an account number, necessary to verify SWEPCO provides electric delivery service to their facility
- Provide access to project facilities both before and after project completion for inspection of the baseline and post-retrofit condition

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- Pay any remaining project cost to the participating contractor after program incentives have been applied to the project once installation is complete

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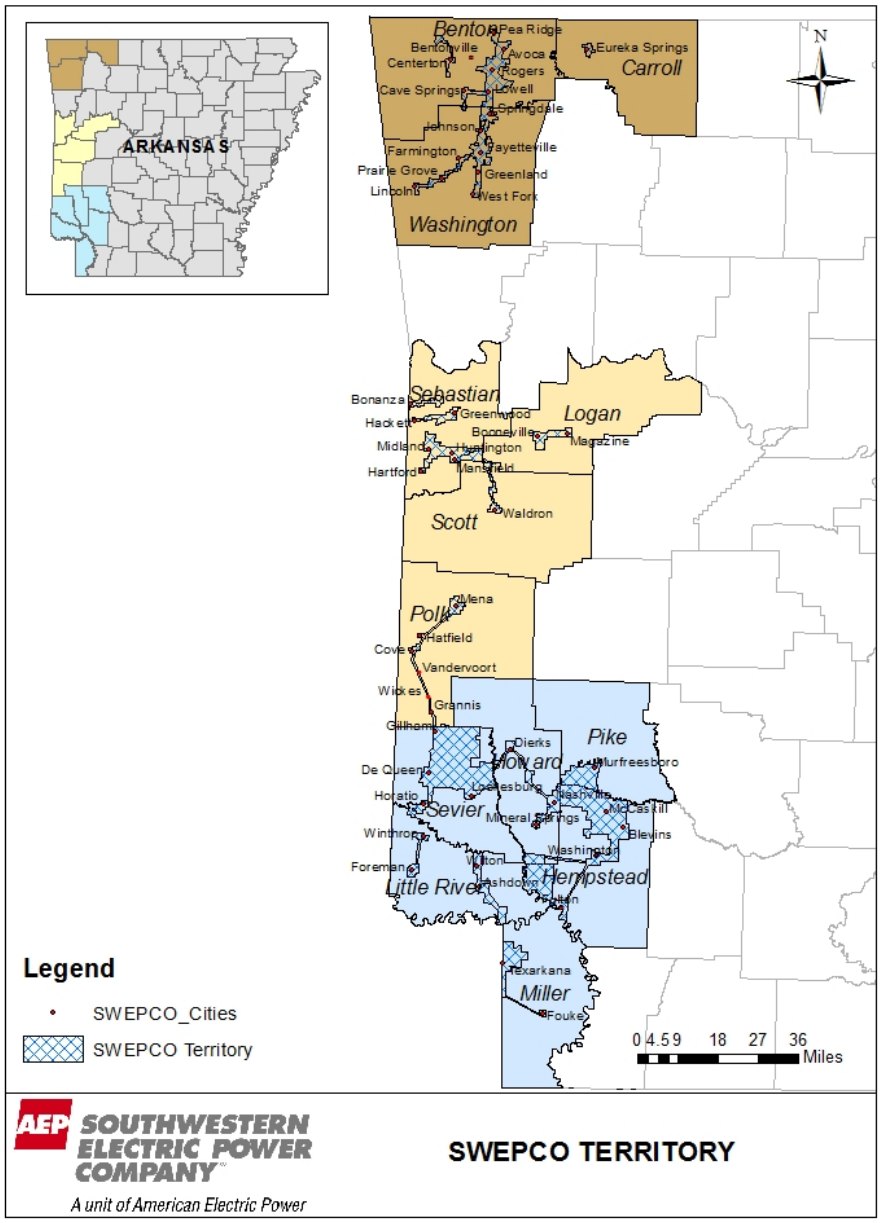
PROGRAM ELIGIBILITY

CUSTOMER ELIGIBILITY

The program is offered to valid SWEPCO customers who have a maximum peak demand usage of 50kW and less at any one facility. For the purposes of this program, a "Customer" is defined by a single Tax ID number.

The map below shows the SWEPCO service areas that are eligible to participate in this program. The maps are provided for reference only, as customers located within these service territories may or may not receive electric delivery service from SWEPCO. For a project at a specific facility to be eligible for financial incentives in the program, the SWEPCO account number must be provided in order to verify SWEPCO provides electric delivery service for the facility.



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Participating Contractor Eligibility

Any contractor who submits a completed and approved Participating Contractor Agreement and agrees to fulfill the role of the participating contractor as laid out in Roles and Responsibilities may participate in the Program. To view contractor eligibility requirements, reference the Participating Contractor Agreement in Appendix F.

Participating contractors have the right and responsibility to use the Proposal App that was designed for use with this program. Access and training on the Proposal App will be as follows:

- The tool will be provided at no cost to participating contractors
- After submitting necessary paperwork to become a participating contractor, they will attend training on effective use of the Proposal App. Instructions for accessing the Proposal App will be provided during this training
- The Proposal App can be installed on a PC, notebook, Android device, Windows mobile platform, or an iOS enabled tablet device
- If for any reason the participating contractor loses the right to participate in the program, the Proposal App will be remotely deactivated

Measure Eligibility

SWEPCO offers incentives for the following measures:

Eligible Deemed Savings Measures	
Lighting Efficiency	• Linear Fluorescent lamp and ballast replacements • High-intensity discharge (HID) fixture replacements • CFLs • LED interior and exterior lamps and fixtures
Refrigeration	• Solid & Glass Door Reach-Ins • ECM Evaporator Fan Motors • Door Heater Controls
Food Service Measures	• Vending Machine Controls • Pre-Rinse Spray Valves
Lighting & HVAC Controls	• Day Lighting Controls • Occupancy Controls (Lighting & HVAC)
Other	• Custom measures as needed and qualified

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SWEPCO SBDI provides financial incentives based upon reductions in energy usage at a facility resulting from the completed installation of an energy efficiency measure which reliably and measurably reduces energy use in accordance with the Arkansas Public Service Commission's active Technical Resource Manual. SWEPCO has made a limited amount of funding available for these incentives to be paid within the 2015 calendar year.

SWEPCO offers the following incentives based on peak electric demand and energy usage:

- For qualified customers (50kW and less) incentives are = $0.16/kWh reduced, up to 90% of project costs.
- A participating contractor may submit one Customer Proposal per property
- A participating contractor may agree to install additional measures; however only installed measures that meet the requirements of the program will receive incentives
- Costs in excess of the incentive amount, costs related to any measure not on the prescribed list, and costs for any measure on the prescribed list that exceed the program project cap are the responsibility of the customer
- Customer Proposals are accepted until 1) all funding is allocated 2) the program completion date comes to pass, or 3) the program is discontinued for any reason. The incentive is payable upon the verified completion of the project (as described in the Customer Proposal). The process for oversubscription is included in the Limits on Participation section
- Program incentives will be paid directly to the participating contractor after the project is completed, documented and verified (post-inspection is required). Checks will be issued within 30 days of project verification
- No participating contractor has an unconditional entitlement to program incentive funds

Savings Calculations and Verification

The program will provide post-inspections, deemed savings calculations, and other verification activities.

M&V procedures will vary in detail and rigor depending on the measures installed. For each installed measure, the chosen procedures will depend upon the predictability of equipment operation, the availability of evaluation data from previous programs, and the benefits of the chosen M&V approach relative to its cost.

All lighting products installed that receive program incentives must meet the Lighting Product Quality Requirements provided in Appendix A.

All projects submitted by each participating contractor will be subject to a pre-inspection to verify:

- Correct facility type
- Existing equipment type and number of units/fixtures
- Recommended measures
- Customer satisfaction

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All projects installed may be subject to a post-inspection to verify:

- Installed new equipment type and number of units/fixtures
- Quality of installation
- Operating hours reported in survey
- Customer satisfaction

Program Processes

Program Implementation and Delivery

Key elements of the program implementation strategy include:

- Trade ally recruitment and training: The program will recruit and train a limited number of contractors to perform facility surveys, identify potential lighting projects and/ or other energy efficiency opportunities. Contractors will be recruited to participate in training sessions regarding program incentives, participation processes and requirements, and use of the Proposal App
- Customer recruitment: Customers will be recruited through outreach conducted by the Implementer and participating contractors
- Technical assistance: The Implementer will guide customers and participating contractors through the participation process to maximize knowledge of program processes and requirements and to overcome barriers to participation. Where needed, the Implementer will also provide technical assistance to customers to identify and implement cost-effective energy efficiency measures
- QA/QC review: Customer Proposals will be subject to a quality assurance review by program technical staff to ensure accuracy of savings and incentive calculations
- Project verification: SWEPCO and the Implementer reserve the right to site-verify installations prior to project approval. All projects may receive a post-inspection by the Implementer prior to incentive payment

Customer Proposal Process

Once a participating contractor has been approved for the program, the participating contractor may begin submitting projects via a Customer Proposal for approval. Project approval by the Implementer is required before incentive funds are reserved.

Below is a step-by-step process by which a participating contractor may identify a project opportunity and have it accepted into the program with financial incentives reserved. The incentive for a project is paid following this process:

- Qualifying Participant Verification
- Facility Assessment
- Signed Customer Proposal
- Pre-Installation Inspection
- Project Approved / Incentives Reserved

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- Project Installation
- Project Completion Notice
- Post-Installation Inspection
- Incentive Payment

Project Identification

Participating contractors conduct facility surveys for qualified small businesses. Qualified small businesses that accept program-provided surveys are asked to sign a Customer Proposal on the date of the survey. Upon receipt of a signed Customer Proposal, the Implementer will review the Customer Proposal for completeness and eligibility. The Implementer may deny approval of a Customer Proposal for a variety of reasons, including, but not limited to:

- The Customer Proposal is incomplete
- The Customer Proposal is received after all funding has been reserved by other participating contractors
- The participating contractor fails to meet program requirements
- The participating contractor fails to submit the required supporting documentation
- The participating contractor is found to have made material misrepresentations in the Customer Proposal
- The participating contractor fails to comply with applicable federal, state and local laws and regulations. Specifically if participating contractor's status changes after initial qualification and enrollment

If the Implementer denies approval of a Customer Proposal, the Implementer will follow up with the participating contractor to request specific information or recommend specific steps to revise the Customer Proposal. The participating contractor can submit the revised Customer Proposal and the Implementer will consider it for approval by the date the new submission is received.

The participating contractor will follow up with qualified small businesses that accept surveys but do not move ahead with projects. Qualified small businesses are expected to exert their best efforts to submit and complete viable projects. The program is not intended to simply provide assessments and customer education. It is intended to stimulate the installation of improvement projects that result in verifiable energy savings for customers, provide business for participating contractors, and add to local economy.

Pre-Installation Inspection and Incentive Reservation

The Implementer will send an inspector to the site or sites to perform a pre-installation inspection (if required) and then notify the customer stating that incentive funding has been reserved for the project(s). A pre-installation inspection must pass before any installation work can begin. If pre-installation inspection fails, the Customer Proposal will be reviewed and updated to depict corrections.

Incentives are subject to availability and reservation. In order to receive incentives from the program, participating contractors must first reserve incentives by completing and submitting a

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signed Customer Proposal for each individual project. The Implementer will review submitted Customer Proposals and approve eligible projects for an initial incentive reservation. The Implementer will update the participating contractor if any significant changes are made to the incentive amount reserved for their projects. For more information, please see the "Limits on Participation" section.

Project Installation

Upon completion and written approval of the pre-installation inspection, the participating contractor proceeds with the project installation. Participating contractor must notify the Implementer immediately of any and all changes to the project scope, equipment selection, or timeline during installation.

Project Completion Notice

After the project has been installed, the participating contractor will notify the Implementer of the project's completion as soon as possible in order to arrange a post-installation inspection of the project. The participating contractor is expected to work with the Implementer to confirm (and update if necessary) the supporting documentation that accompanied the approved Customer Proposal for the now completed project.

Post Installation Inspection

Once the project is completed, the Implementer schedules a post-installation inspection. Using the most recent project documentation, a program inspector will visit the site or sites to verify the equipment has been replaced as indicated. The participating contractor must provide a knowledgeable representative to accompany the inspector on the post-installation inspection.

The Implementer will pre and post inspect 100% of the first five projects submitted by each contractor. Once a contractor successfully passes the initial five period, an ongoing QC process will be implemented requiring 100% verification on all documentation, and inspections of 20% of total project installations – proportionate to contractor project volume. If a contractor is observed repeatedly failing inspections, or not meeting customer satisfaction requirements, a three strikes policy consisting of an initial notification and correction, probation, and finally program exclusion will be implemented.

Incentive Payment Process

Any incentives received through the program are paid directly to the participating contractor after the project is completed, verified, and a post-installation inspection is conducted. Using the results of the post-installation inspection, the Implementer will determine the eligible peak demand savings (kW) and annual energy savings (kWh/yr) for the project and determine the amount of incentives due to the participating contractor. The program is not under any obligation to provide a participating contractor with more incentives than the amount reserved by the Customer Proposal for any project, even if the participating contractor achieves greater energy savings by the project than were estimated. However, if budget is still available when a project achieves greater energy savings than estimated, the Implementer has the option to pay the

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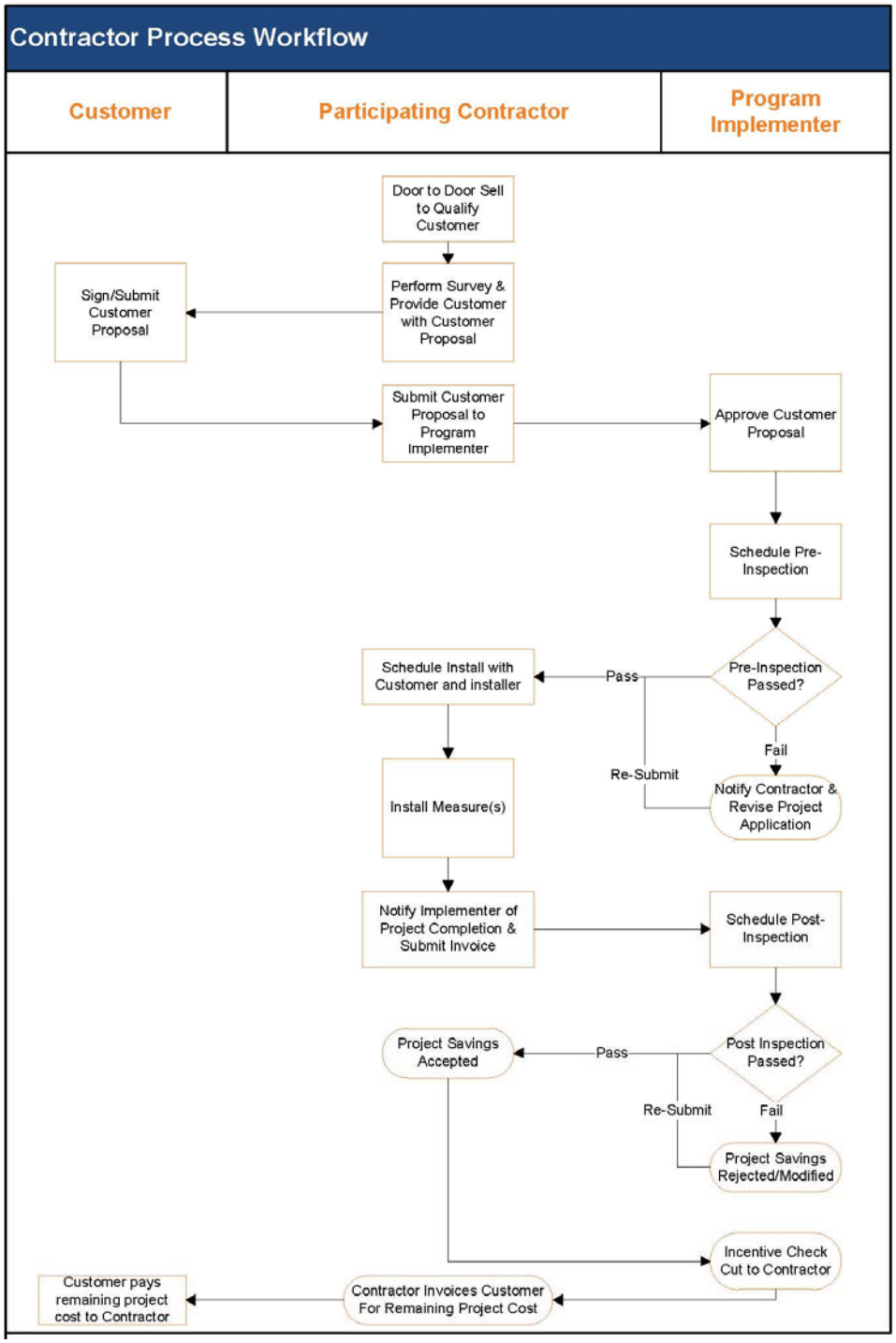
participating contractor more than the amount reserved, up to the incentive calculated by the achieved energy savings. For additional details on how incentive payments are determined, scheduled, and paid, please see the “Measure Eligibility” section in this manual.



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QUALITY MANAGEMENT SYSTEM

Quality Assurance	
Program Process Trainings (QA)	• The participating contractor will perform an initial survey to identify energy efficiency opportunities. The participating contractor will work with the customer to identify cost-effective upgrades based on the survey findings and their specific needs • Participating contractors will be educated about the program's process for identifying and incentivizing energy efficiency projects
Customer Proposal Review (QA)	• Customer Proposals are reviewed and verified by the Implementer

Quality Control	
Post-Installation Inspections (QC)	• All projects may receive a pre-inspection. All projects may receive a post-inspection. Any issues noted during the inspections will be discussed with the participating contractors and recommendations for program compliance will be made. Any changes in project scope identified during the post-inspection may result in an adjustment of projected savings and incentive amount
Customer Satisfaction Surveys (QC)	• The Implementer may conduct Customer Satisfaction Surveys

LIMITS ON PARTICIPATION

Incentive budgets available through the program are limited and are made available to participating contractors on a first-come, first-served basis. In the event that incentive reservations exceed the program budget for incentives, the program is considered fully or over-subscribed. If oversubscription to the program should arise, participating contractors will be placed on a waiting list, in the order of when the Customer Proposal was received. Participating Contractors on the waiting list may be able to reserve program incentive funding if projects are cancelled and funds become available.

PROGRAM NON-CONFORMANCE

CUSTOMER SATISFACTION

Customers are encouraged to contact program contacts listed on page 14 to report and resolve any complaints about the program. Receiving direct feedback from customers is an essential

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part of the QA process. Customer feedback can help determine customer satisfaction, program compliance, and identify high and low performing contractors. Customer satisfaction feedback can result in a corrective action (see below: Addressing Non-Conformances and Failures).

Addressing Non-Conformances and Failures

Non-conformance occurs whenever the acceptable variance for a quality indicator is not met or the installation does not measure up to the state and local building standards. The following qualify as non-conformance:

- Installed measures that do not meet industry best practices and standards
- Incorrect incentive amounts based on inspection findings
- Customer or measure eligibility issues
- Customer dissatisfaction

Critical And Non-Critical Issues

Critical issues will move directly to a corrective action that may include a suspension or removal from program participation.

Non-critical issues are things that do not adversely impact the kW and kWh savings and incentive calculations, but that are not accurately recorded and reported, such as equipment model numbers, will be recorded in an Issue Log. If a contractor has repetitive non-critical issues reported on the Issue Log it will be deemed as a systemic issue and will be addressed with a Corrective Action.

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PROGRAM CONTACT INFORMATION

For questions on program implementation including inspections, payment questions, participation questions, etc., contact:

SWEPCO
Contact: Sherry McCormack
Phone: 479.973.2404
Email: slmccormack@aep.com

CLEAResult
Contact: Ryan Parrish
Phone: 479.935.9060
Email: ryan.parrish@clearesult.com

www.swepcogridsmart.com

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DISCLAIMERS

The selection of a participating contractor to perform work is the sole decision of the property owner, customer, and/or authorized lessee/occupant. Inclusion of a contractor in the participating contractor list for the program does not constitute an endorsement of any product, individual, or company by SWEPCO or the Implementer. Work performed by participating contractors is not guaranteed or subject to any representation or warranty, either expressed, implied or otherwise, by either SWEPCO or the Implementer. Neither SWEPCO nor Implementer make any guarantee or any other representation or warranty, expressed, implied or otherwise, as to the quality, cost, or effectiveness of any product(s) provided or work(s) performed by any participating contractor, any participating contractor employees, subcontractors, or supplies. Energy efficiency gains are subject to a number of variable conditions and circumstances. While it is the intent of the program to achieve energy efficiencies, neither SWEPCO nor Implementer warrants that any specific energy efficiency gains will be achieved for a particular customer under the program.

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APPENDICES

Appendix A	QAQC Requirements
Appendix B	Definitions
Appendix C	Frequently Asked Questions
Appendix D	Program Marketing Material
Appendix E	Participating Contractor Agreement

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QAQC REQUIREMENTS

All products installed as part of SWEPCO SBDI must meet the following Quality Requirements in order to receive program incentives.

Summary of Lighting Quality Requirements

- Ballast, lamp, LED product and control check have been rolled into a broader *Equipment Checks* step
- Ballast Check
  - Requirements for 8-foot T8 systems, where system efficacy (incl. ballast and lamps) must be greater or equal to 80 mean lumens per watt (MLPW)
  - CEE qualified ballast requirements now extend to ballasts running 2-foot, 3-foot, 4-ft 30W, and U-bend T-8 lamps
- Lamp Check
  - Requirements

Specifications for Qualifying T8 Lamps and Ballasts					
Lamp Description	**Rated Lamp Life (hrs)**	**CRI**	**Initial Lumens per Lamp**	**Mean Lumens per Lamp**	**Minimum Mean Lumens per Watt (MLPW)**
4-foot and U-Bend T8 Lamps [1]	≥ 24,000	> 80	≥ 3100	≥ 2900	90 (IS ballast) [3] 88 (PRS ballast) [3]
4-foot and U-Bend T8 25W and 28W Reduced Wattage Lamps [2]	≥ 18,000	> 80	≥ 2585(28W); ≥ 2400 (25W)	≥ 2430(28W); ≥ 2256 (25 W)	90 [3]
2-foot T8 and Reduced Wattage lamps	≥ 20,000	> 80	NA	NA	75 [4]
3-foot T8 and Reduced Wattage Lamps	≥ 20,000	> 80	NA	NA	75 [4]
4-foot T8 30W Reduced Wattage Lamps	≥ 24,000	> 80	NA	NA	80 [4]
8-foot T8 Lamp and Ballast Systems	≥ 18,000	> 80	NA	NA	80 [3]
21.5"/22.5" Reduced Watt long twin tube CFL	≥ 20,000	> 80	NA	NA	92 [4]

1) For lamps with color temperatures > 4500 K, minimum requirement of 2950 initial and 2750 mean lamp lumens

2) For lamps with color temperatures > 4500 K and/or > 24,000 hrs rated life, minimum requirements of 88 MLPW system efficacy and for 28W lamps (2600 initial lumens; 2430 mean lumens) and 25W lamps (2300 initial lumens; 2185 mean lumens)

3) System Efficacy = Mean System Lumens/System Wattage; Lamp and Ballast performance taken together.

4) Lamp Efficacy = Mean Lumens/Lamp Wattage

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- LED Product Checks, similar to ballast/lamp checks, have been added
    - Resolutions to special cases where unqualified LEDs cannot be avoided
- For 4-foot T8 system retrofits, only CEE-approved T8 lamps and CEE-approved premium efficiency ballasts qualify. Similar requirements apply to 2-foot, 3-foot, U-bend and 30W 4-foot T8 lamps and ballasts and 8-foot T8 lamps
- There are special procedures described at the end of this section for re-lamping projects

Lighting Project Document Requirements

All deemed savings projects require complete documentation of the items below:

- If invoice or shipping receipt cannot be obtained, legible photo documentation will be required
- Insufficient equipment documentation will result in reduced savings or disqualification of the project
- Project Invoices or Shipping Receipts that contain legible part numbers and quantities for all project ballast, lamp, LED product and control equipment are required
- CEE Ballast requirements that were effective in 2011 will be monitored and validated against required invoice/receipt/photo documentation
- CEE lamp requirements that were effective in 2011 will be monitored and validated against required invoice/receipt/photo documentation
- LEDs with insufficient documentation will be treated as unqualified LEDs and cannot receive program incentives
- Fixture Counts
- Fixture Type
- Fixture Location
- Equipment Checks: Ballast, Lamp, LED product, and Control
- Building Type
- Number of Non-Operating Fixtures
- Inspection

Please note the following:

- Any fixtures or areas NOT represented in a pre-inspection form for retrofit projects do not qualify for savings. Multiple pre-inspection forms may be completed for a project prior to removal
- A retrofit project will be considered non-compliant only if building type changes (e.g., warehouse converted to an office building) and/or the building is demolished to the structure (i.e., gutted).

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Lighting Project Requirements/Deemed Equipment Requirements

Ballast Check—Retrofit

- Only premium ballasts will be allowed
- Only CEE- approved ballasts will be considered premium ballasts for 2-foot, 3-foot, U-bend and 4-foot T8 systems. Must be validated by Project Invoice, or Shipping Receipt or Photo documentation. Consult CEE Web site for the latest listings: http://www.cee1.org/com/com-lt/lamps-ballasts.xls
- 8-foot T8 systems (lamp and ballast combination) must meet the total system efficacy requirements shown in the Non-CEE Specifications for T8 Lamps and Ballasts table below to be considered premium.
    - Specification sheet on all 8-foot lamps must be provided showing the part number, the mean lumens, the rated life, and the CRI; Part number must be validated by Project Invoice, or Shipping Receipt or Photo documentation.
- Project invoice or shipping receipt documentation is required to verify savings and eligibility. Legible part numbers and quantities of all installed ballasts must be included

If invoice or shipping receipt cannot be obtained, legible photo documentation of ballast part numbers installed in field will be required for the fixtures identified.

Lamp Check—Retrofit

- Only premium lamps, as defined below, will be allowed.
- 4-foot T8 Lamps: Only CEE- approved lamps will be considered premium lamps. Must be validated by Project Invoice, or Shipping Receipt or Photo documentation. Consult CEE Web site for the latest listings: http://www.cee1.org/com/com-lt/lamps-ballasts.xls
- 2-foot, 3-foot, U-bend, 30W 4-foot, 8-foot T8, and CFT40W long twin tube CFL lamps must meet all the applicable requirements in the table below to be considered premium
    - Specification sheet on the lamps must be provided showing the part number, the mean lumens, the rated life, and the CRI; Part number must be validated by Project Invoice, or Shipping Receipt or Photo documentation
- Project invoice or shipping receipt documentation is required to verify savings and eligibility. Legible part numbers, quantities of all installed lamps, and costs must be included

If invoice or shipping receipt cannot be obtained, legible photo documentation of lamp part numbers installed in field will be required for the fixtures identified.

	Minimum Mean Lumens per Watt (MLPW)	Color Rendering Index (CRI)	Rated Lamp Life (hrs)
2-foot T8 and Reduced Wattage lamps	75 MLPW*	>80	20,000
3-foot T8 and Reduced Wattage Lamps	75 MLPW*	>80	20,000
4-foot T8 30W Reduced Wattage Lamps	80 MLPW*	>80	24,000

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8-foot T8 Lamp and Ballast Systems	80 MLPW**	>80	18,000
22.5" U-Bend T8 Lamps	80 MLPW*	>80	18,000
21.5"/22.5" Reduced Watt long twin tube CFL (CFT40W)	92 MLPW*	>80	20,000

* Lamp Efficacy = Mean Lumens/Lamp Wattage

** System Efficacy = Mean System Lumens/System Wattage; Lamp and Ballast performance taken together.

LED Product Check

- Particular products or applications are subject to either ENERGY STAR or DLC requirements, but never both. See LED Product Qualification Listing below for a listing of what products/applications are currently covered by what approval body and go to the appropriate link shown to see if a particular product has been approved[1]
- Only LEDs that appear on the approved listings qualify for incentives
- Project invoice or shipping receipt documentation is required to verify savings and eligibility; Legible part numbers, quantities of all installed LEDs, and costs must be included
- If invoice or shipping receipt cannot be obtained, legible photo documentation of LED part numbers installed in field will be required for the fixtures identified
- Resolutions to special cases where unqualified LEDs cannot be avoided on a project are provided at the end of this LED section
- LED products with insufficient documentation will be treated as unqualified LEDs and will not receive program incentives

LED Product Qualification Listings	
ENERGY STAR LED Lamps (Bulbs) http://www.energystar.gov → Find ENERGY STAR Products → LED Light Bulbs	• Integral Lamps – “LED Light Bulbs”

1 Products and Applications are added or dropped by these approval bodies periodically, so please check the links provided for the most up-to-date information.

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ENERGY STAR LED Fixtures http://www.energystar.gov → Find Energy Star Products → Business & Government → Commercial LED Lighting	• Recessed Downlights • Under-cabinet task lighting • Desk task lamps	
Design Lights Consortium (DLC) LED Fixtures: http://www.designlights.org → Solid State Lighting → Qualified Products List (QPL)	• Outdoor Area/Roadway • Outdoor Decorative • Outdoor Wall-Mount • Parking Garage • Track and Directional • Refrigerated Case-Horizontal • Refrigerated Case-Vertical • Display Case	• 2x4, 2x2 and 1x4 troffers • Floodlights • Retrofit kits • Highbay/Highbay Aisle/Lowbay • Fuel Pump Canopy • 4-foot Linear Replacements Lamps • Bollards • Wall-wash Luminaires

Special Case Resolutions for Unqualified LEDs

- If unqualified LEDs are included in a retrofit project, options include:
  - Get qualified LED products substituted
  - Seek qualification of the product through one of the approved options listed
  - Use the pre-retrofit fixture code for both pre and post
- If unqualified LED makes up a significant portion of a project, options include:
  - Get qualified LED products substituted
  - Seek qualification of the product through one of the approved options listed

Control Check

- Select the appropriate control type or combination of control types for both pre and post, as is applicable to the project
- Project invoice or shipping receipt documentation is required to verify savings and eligibility. Legible part numbers, quantities of all installed controls, and costs must be included
- If invoice or shipping receipt cannot be obtained, photo documentation of controls installed in field will be required for the controls identified

Re-lamping Projects for Linear Fluorescents

- Project Invoice or Shipping Receipt is required (as outlined in the Equipment Check) to validate lamp eligibility
- Reduced-wattage lamps used in re-lamping projects must be CEE listed lamps

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- Lamp Checks will be performed
- For projects that involve whole system (lamp and ballast) change outs, use the standard program Lighting Survey Form to document those savings
- De-lamping outside the context of full system (lamp and ballast) change out is not eligible

Summary of Non-Lighting Quality Requirements

All non-lighting measures meeting the requirements of APSC's active Technical Resource Manual will be handled individually between the coordination of the participating contractor and the Implementer.

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DEFINITIONS

Customer Proposal – In order to qualify as a participant and reserve financial incentives through SWEPCO SBDI, participating contractor must submit a signed Customer Proposal, and provide complete details on the location, account, etc., of the participating customer.

Deemed Savings – A set of pre-determined, validated estimates of energy and peak demand savings attributable to energy efficiency measures in particular types of applications that an electric utility may use instead of energy and peak demand savings determined through measurement and verification activities.

Demand Savings (kW) – Peak demand savings that have been approved using one of the eligible measurement and verification protocols as set forth in this Program Manual.

Estimated Incentive Payment – Contained in the Customer Proposal (once approved by the Implementer), this is the amount of incentives reserved in the program budget for the list of committed projects.

Participating Contractor Agreement – Non-binding agreement signed and submitted by participating contractor, stating their intent to participate in the program.

Peak demand – Electrical demand at the times of highest annual demand on the utility's system.

Peak demand reduction – Reduction in demand on the utility system throughout the utility system's peak period.

Peak period – For the purpose of this section, the peak period consists of the hours from one p.m. to seven p.m., during the months of June, July, August, and September, excluding weekends and Federal holidays.

Post-Installation Inspection – Inspection performed after installation of new equipment. Post installation inspection verifies actual installed measure(s) to verify resulting deemed or measured and verified demand and energy savings.

Pre-Installation Inspection – Inspection performed prior to any replacement of existing equipment or device to validate and collect data on existing equipment and measures.

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FREQUENTLY ASKED QUESTIONS

FOR CUSTOMERS

Q1. What is the Program?

A1. SBDI brings energy efficiency solutions to small businesses. The program offers the following incentives to eligible customers:

- Free, no-obligation facility assessment to identify potential energy-saving opportunities
- Recommendations and estimates of energy savings, project costs, and payback periods
- Installation of approved energy-saving equipment by a local pre-qualified contractor
- Pre- and post-installation inspections at no cost
- Incentives paid directly to your contractor by the program

Q2. How do I know if I am an eligible customer?

A2. SBDI is available to non-residential commercial class customers with a valid SWEPCO account number and whose peak demand is 50kW and less.

Q3. Which products qualify for incentives?

A3. Incentives are available through a participating contractor for qualifying high efficiency lighting, water heating, and refrigeration technologies. Incentives will be reflected as a discount on your contractor's bill.

Q4. How do I find a participating contractor?

A4. Visit www.swepcogridsmart.com for a list of participating SWEPCO contractors and their contact information.

FOR CONTRACTORS

Q1. What are the incentives?

A1. The Program will pay $0.16/kWh reduced for customers up to 90% of the project cost.

Q2. How do I get involved?

A2. Visit www.swepcogridsmart.com or contact a SWEPCO SBDI representative at 479.935.9060.

Q3. How do I schedule a training session?

A3. Contact Shannon Joyce at Shannon.Joyce@CLEAResult.com or 479.439.0294 to schedule a training session.

Q4. What's involved in training?

A4. Participating contractors will participate in classroom and field training using the Proposal Generation Software Application (Proposal App), which enables contractors to do the following:

- Perform facility surveys for measures listed in the "Measure Eligibility" section
- Generate Customer Proposals which (upon program approval) reserves incentives for the projects
- Obtain electronic customer signature
- Submit Customer Proposal to reserve program funds
- Track project and incentive status

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Q5.How much does the field tool cost?

A5.The Proposal App is provided to approved participating contractors free of charge, upon completion of the Participating Contractor Agreement. Any participating contractor wishing to utilize the Proposal App will be responsible for acquiring his/her own mobile device.

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MARKETING MATERIALS - EXAMPLE

Below is an example of marketing materials that may be provided by the program team

Available Incentives

AEP SWEPCO offers the following Small Business incentives based on your peak electric demand and energy usage.

Arkansas non-residential customers with ≤50 kW demand:
$0.14 per kWh saved
Up to 90% of project cost

CFLs, vending machine controls, faucet aerators, and pre-rinse spray valves with electric water heating: 100% of the cost.

Eligible Projects

Eligible energy efficiency measures include indoor lighting, outdoor lighting, refrigeration, and electric hot water. The Program pays a higher percentage of project costs, when compared to other commercial energy efficiency programs. Incentives, actual savings, and payback periods vary depending on the equipment installed, building characteristics, energy use patterns, age of existing equipment, location, and other parameters specific to your project.

Eligible Measures

- T12 to T8 lighting retrofits*
- LED lighting upgrades*
- Occupancy sensor installations
- LED exit sign retrofits
- Anti-sweat heater controls for refrigerator doors
- Faucet aerators and pre-rinse spray valves
- And more!

**T8 system retrofits must meet the CEE specifications for High Performance or Reduced Wattage systems to be eligible for incentives. LED retrofits must by DLC approved or ENERGY STAR labeled.*

AEP SOUTHWESTERN ELECTRIC POWER COMPANY™
A unit of American Electric Power

It's your bottom line - take control of your energy choices.

For more information, call **1-888-266-3130** to speak with a program representative, e-mail **info@SWEPCOgridSMART.com** or visit **SWEPCOgridSMART.com**.

gridSMART® is provided by SWEPCO as part of the company's commitment to reduce energy consumption and demand. CLEAResult administers SWEPCO's Arkansas gridSMART initiative as an independent consultant.

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AEP SOUTHWESTERN ELECTRIC POWER COMPANY™
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You have the power to lower your energy bill

Energy-saving solutions for AEP SWEPCO small business customers!

gridSMART®
From Southwestern Electric Power Company

APSC FILED Time: 4/29/2016 12:50:40 PM: Recvd 4/29/2016 12:41:18 PM: Docket 07-082-TE-Doc. 396

AEP SWEPCO

The Program offers:

- Free, no-obligation facility assessment to identify potential energy-saving opportunities
- Recommendations and estimates of energy savings, project costs, and payback periods
- Installation of approved energy-saving equipment by a local pre-qualified contractor
- Incentives paid directly to your contractor by the program to reduce your costs of adopting energy-efficient equipment
- Ongoing reduction in energy costs

Who is eligible?
Small commercial customers with:

- A valid SWEPCO Arkansas account number
- ≤ 50 kW demand

Let's get started

1. Contact a participating contractor.
2. Participating contractor will schedule a no-cost walk through assessment of your facility.
3. Upon your approval, the program's participating contractor will install savings measures.

Typical Small Business project scenario

This hypothetical example illustrates a scenario that could take place at a small office building. Simulated existing conditions and sample proposed retrofits are listed with a summary estimate of energy and cost savings below. The data below illustrates how the program operates and its potential value, but is not necessarily indicative of what you may see at your site.

EXISTING INTERIOR LIGHTING	INTERIOR LIGHTING RETROFIT
32 4-lamp T12	32 2-lamp T8
16 60-watt incandescent	16 15-watt CFL
16 2-lamp T12	16 2-lamp T8 reduced wattage

Project by the numbers

13,561 kWh
total annual energy savings

$1,898
estimated incentive

$1,798
net cost to customer

$3,696
total cost

$1,356
estimated annual bill savings

1.3 years
payback

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SWEPCO is offering SBDI to improve the energy efficiency of small commercial facilities located within SWEPCO's Arkansas service territory. SWEPCO contracted with CLEAResult to promote and administer the program.

Contractor Network Benefits

The program provides the following benefits to participating contractors:

- Training for participating contractors
- Complimentary access and support to the Proposal Generation Software Application (Proposal App) to quantify, and demonstrate the value of energy efficiency opportunities and incentives provided by the program
- Access to trainers who are available to assist in clarifying program processes and use of the Proposal App
- The opportunity to promote and market the program to customers of SWEPCO
- Aggressive peak electric demand savings-based incentives aimed at increasing customer adoption of energy efficiency measures

Participation Requirements

Insurance

During the term, participating contractors shall maintain and provide proof of the following Commercial General Liability Insurance Minimums:

- $1,000,000 general liability insurance coverage
- Worker's compensation and employer's liability coverage
- Business automobile liability coverage including owned, non-owned, and hired vehicles

Licenses

At all times during the program, participating contractors must adhere to all permitting and licensing requirements as set forth by federal, state, county, and/or municipal authorities with jurisdiction overseeing work performed.

Enrollment Instructions

Step 1: Complete an Application and Agreement.
Step 2: Complete a W-9
Step 3: Submit completed Application and Agreement, W-9, certificate of insurance, and copies of required licenses and/or training certificates (if applicable) via:

Email: info@SWEPCOgridSMART.com

Mail: SWEPCO SBDI
PO Box 9567
Fayetteville, AR 72702

APSC FILED Time: 4/29/2016 12:50:40 PM: Recvd 4/29/2016 12:45:18 PM: Docket 07-082-TF-Doc. 386

Company Information					
Company Name:					
Address:					
City:		State:		Zip:	
Contact Name:					
Phone:		Fax Number:			
E-Mail Address:					
Website					
Mailing and Incentive Information					
Mailing Address:					
City:		State:		Zip:	
Company Tax ID or SSN:					

Please identify products and/or services provided by company.

- ☐ Lighting Efficiency
- ☐ Lighting Controls
- ☐ Refrigeration
- ☐ Other

*Required BPI or RESNET certified auditor on staff? ☐ Yes ☐ No

Staff, Training, and Certifications

Staff Member Name	Trainings/Certifications	Date Completed

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Terms and Conditions

This Contractor Agreement ("Agreement") is made and entered into by and between CLEAResult, (hereinafter "Implementer"), and _____ (hereinafter "Participating Contractor"), (Implementer and Participating Contractor each hereinafter referred to as a "Party" and together as the "Parties"). Implementer administers the Small Business Direct Install program (hereinafter "Program") on behalf of SWEPCO, a division of American Electric Power (hereinafter "Utility"). In consideration of the mutual covenants and agreements hereinafter set forth, the adequacy and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

As a Participating Contractor in the Program, Participating Contractor hereby agrees to the following:

1. The Participating Contractor agrees to the roles, responsibilities, requirements, policies, terms, conditions, and guidelines of the Program as set forth in the 2015 SBDI Program Manual.
2. Participating Contractor is an independent contractor in relation to the Implementer and Utility, and is voluntarily participating in the Program to deliver the services as outlined in the program manual directly to customers for whom Utility provides electric delivery service ("Customer"). As such, Participating Contractor shall not be deemed a partner, agent, or employee of the Implementer, Utility, or Customer for any purpose. Participating Contractor will pay all of its administrative, overhead, and other costs, including withholding taxes, social security, unemployment, disability, health, workers' compensation, or other insurance coverage.
3. Participating Contractor shall not knowingly misrepresent any information concerning the Program, its purpose, policies, incentives, and procedures, or their role in the Program or relationship with the Implementer or the Utility.
4. Participating Contractor acknowledges that incentives will be paid by Utility only if: 1) Customer(s) and installed measure(s) or services meet the program eligibility requirements outlined in the program manual; 2) Measures are installed in project sites that receive delivery of electricity from Utility (SWEPCO's Arkansas service territory) as evidenced by the meter number; and 3) Measures are installed at a project site that has not received incentives from any other of Utility's energy efficiency programs for the same measure(s). Participating Contractor understands that Utility may withhold incentive payments committed to the Participating Contractor if the project site is proven to not receive electric delivery service from Utility.
5. Participating Contractor will, at its sole expense, purchase, maintain, and require its agents and subcontractors to purchase and maintain, during the term of its participation in the Program, insurance policies with substantial and sound insurers, having coverage of the types and at least in the amounts specified in this Agreement.
6. Participating Contractor shall not use the Implementer or its affiliates, or SWEPCO trademarks without written approval by the Implementer, or Utility respectively.
7. The Implementer has the sole right and authority to determine acceptance of Participating Contractor's application and resulting right of participation in the Program.
8. Participating Contractor must agree to pursue referral leads resulting from the Program's marketing and communications efforts, and must make a good faith effort to provide, in a timely fashion, services to these leads in accordance with the Program guidelines and this Agreement. Participating Contractor recognizes that any leads received as a result of the Program's efforts constitute a Program benefit.
9. Participating Contractor understands that participation in the Program does not constitute an endorsement of any kind on the part of the Implementer or Utility. Participating Contractor shall not state or imply any such endorsement, either directly or indirectly, in written or verbal form.
10. Participating Contractor shall not mislead any customer(s) about the availability of Program incentives or misrepresent its role in the incentive award process. Only Utility or the Implementer on behalf of Utility, in its sole discretion can approve or reallocate Program incentives for a customer.
11. Participating Contractor must possess the required diagnostic equipment, in good working order, and have the ability to deploy it at each participating location, prior to commencing comprehensive energy audits and installing measures under the Program.
12. Participating Contractor, and its agents and subcontractors, shall retain all necessary licensures, certification, training, and other requirements as deemed necessary by state law, the Program policies and guidelines, and all relevant documentation pertaining to the installation of the energy efficiency measures, and will provide immediate access to such documentation to the Implementer and Utility upon request. This includes but is not limited to appropriate liability insurance, permits, licensure, or certification information, installed equipment model and serial numbers, etc.
13. Participating Contractor must agree to allow random field inspections, by Utility, the Implementer or its designee, of work that has been performed. Participating Contractor, upon request from Utility or the Implementer, and at no additional cost to the customer, shall make reasonable repairs or corrections to work that Participating Contractor has performed to bring such work up to Program standards.
14. Participating Contractor, its employees, agents and subcontractors, represent and warrant that: 1) the services performed for a customer through the Program shall be performed in a good workmanlike, skilled, and professional manner; 2) the services shall comply in all material respects with the specification and other requirements set forth in each applicable contract with customer and in strict accordance with the Program and this Agreement; 3)

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Participating Contractor's performance of the services shall not violate any applicable law, rule, regulation, contracts with third parties, and/or any third-party rights, including, without limitation, any copyright, trademark, trade secret, or patent or similar right; and 4) Participating Contractor is the lawful owner or licensee of any intellectual property, software applications or other materials used by Participating Contractor in the performance and delivery of the services and has all rights necessary to convey to customer the unencumbered ownership of all work product that results from the services.

15. Participating Contractor understands that the Implementer reserves the right to terminate or to modify this Agreement at any time for Participating Contractor's noncompliance with the program manual, any law, any clause of this Agreement. In the event of termination of this Agreement by the Implementer, Participating Contractor will be notified of such termination in writing, and Participating Contractor will be allowed 30 days from the date of the termination to submit any remaining documentation for qualifying energy efficiency measures that have previously been installed for a customer by the Participating Contractor.
16. Participating Contractor acknowledges that the Implementer is an independent contractor with respect to Utility and the Program, and that beyond reserving incentive funds, the Implementer is not authorized to make reservations or incur obligations on behalf of Utility.
17. Any review, inspection, or acceptance by the Implementer or Utility of the project site or of the design, construction, installation, operation or maintenance of any energy efficiency measure and/or energy generation measure(s) by the Implementer or Utility is solely for the information of Utility and that, in performing any such inspection or review or in accepting an energy efficiency measure and/or energy generation measure(s), Utility makes no representation or warranty whatsoever, whether expressed or implied, including without limitation warranty of merchantability and fitness for a particular purpose, as to the economic or technical feasibility, capability, safety, or reliability of the energy efficiency measure and/or energy generation measure(s) or its installation by the Participating Contractor.
18. Participating Contractor shall defend, protect, indemnify, and hold harmless Utility and the Implementer, their respective officers, directors, agents, and employees, and each of their parents and affiliates, and each of their respective officers, directors, agents, and employees (collectively referred to as the "Indemnified Parties") from and against any and all claims, losses, expenses, attorneys' fees, damages, demands, judgments, causes of action, suits, and liability in tort, contract, or any other basis and of every kind and character whatsoever (hereinafter referred to as "claims") arising out of Participating Contractors, or its agents or subcontractors, acts or omissions incident to or related in any way to, directly or indirectly, the services, agreement and/or the Program. Participating Contractor acknowledges and agrees that with respect to any claims brought against the Indemnified Parties, Participating Contractor will be required to waive as to the Indemnified Parties any defense it may have by virtue of the Workers' Compensation Laws of any state, to the extent allowed by law.
19. In the course of participation in the Program, Participating Contractor may have access to confidential information. Participating Contractor agrees to 1) use such confidential information solely for the purposes for which it is provided; 2) not disclose such confidential information to any third party; and 3) otherwise protect such confidential information from unauthorized use and disclosure to the same extent that it protects its own confidential information of a similar nature.
20. Participating Contractor will not assign any of the rights or responsibilities arising from this Agreement to any individual or entity without first having obtained the written approval of the Implementer.
21. In no event shall the Implementer or Utility be liable to Participating Contractor, its employees, agents, or subcontractors for damages whatsoever (including but not limited to lost profits or interruption of business) arising out of the Program, or the services related to this Agreement, even if advised of the possibility of such damages.
22. Participating Contractor agrees that no marketing materials shall be created to promote the Program without prior authorization from the Implementer and Utility. The Implementer will provide approved marketing materials to Participating Contractor.
23. This Agreement shall be governed by and construed in accordance with the laws of the State of Arkansas, The Parties agree that the proper venue and jurisdiction for any cause of action relating to this Agreement will be Washington County, Arkansas, unless such cause of action is within the jurisdiction of the Arkansas Public Service Commission (APSC), in which case proper venue and jurisdiction will be at the APSC.
24. Participating Contractor acknowledges that they have read this Agreement, understand it, and agree to be bound by its terms. No modification or waiver of any provision shall be binding unless it is contained in writing signed by both Parties.

Tax Implications

Incentives are taxable and, if annual total is greater than $600, will be reported to the IRS on Form 1099 unless Participating Contractor has indicated Corporation or Exempt tax status on the Participating Contractor information portion of this Agreement. Participating Contractor must provide the Implementer with its tax identification number on a W9 form. Utility nor Implementer will be responsible for any tax liability imposed on the Participating Contractor as a result of Participating Contractor's receipt of incentives. Participating Contractors and customers are encouraged to consult with their tax advisors about the taxability of any incentive payments.

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Agreement

Company:	SWEPCO	Company:	
Name:	Phillip Watkins	Name:	
Signature:		Signature:	
Title:	Manager, Consumer Programs	Title:	
Date:		Date:	

Available Incentives

AEP SWEPCO offers the following Small Business incentives based on your peak electric demand and energy usage.

Arkansas non-residential customers with ≤50 kW demand:
$0.16 per kWh saved
Up to 90% of project cost

CFLs, vending machine controls, faucet aerators, and pre-rinse spray valves with electric water heating: 100% of the cost.

Eligible Projects

Eligible energy efficiency measures include indoor lighting, outdoor lighting, and refrigeration. Incentives, actual savings, and payback periods vary depending on the equipment installed, building characteristics, energy use patterns, age of existing equipment, location, and other parameters specific to your project.

Eligible Measures

- T12 to T8 lighting retrofits*
- LED lighting upgrades*
- Occupancy sensor installations
- LED exit sign retrofits
- Anti-sweat heater controls for refrigerator doors
- Faucet aerators and pre-rinse spray valves
- And more!

**T8 system retrofits must meet the CEE specifications for High Performance or Reduced Wattage systems to be eligible for incentives. LED retrofits must be DLC approved or ENERGY STAR labeled.*

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- Ongoing reduction in energy costs

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Small commercial customers with:

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- ≤ 50 kW

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2. Participating contractor will schedule a no-cost walk through assessment of your facility.
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Typical Small Business project scenario

This hypothetical example illustrates a scenario that could take place at a small office building. Simulated existing conditions and sample proposed retrofits are listed with a summary estimate of energy and cost savings below. The data below illustrates how the program operates and its potential value, but is not necessarily indicative of what you may see at your site.

EXISTING INTERIOR LIGHTING	INTERIOR LIGHTING RETROFIT
32 4-lamp 4ft. 40W T12	**32** 2-lamp 4ft. 28W T8
16 60W incandescent	**16** 10W LED
16 8ft. 60W 2-lamp T12	**16** 2-lamp T8 4ft. 28W

Project by the numbers

16,883 kWh
total annual energy savings

$2,701
estimated incentive

$1,090
net cost to customer

$3,792
total cost

$1,688
estimated annual bill savings

7.7 months
payback

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Saving Money is Simple with SWEPCO!

CASE STUDY

BY THE NUMBERS

104,447 kWh
savings per year

$10,444
estimated annual savings

$16,711
SWEPCO incentive

$20,563
installed cost

$3,852
total cost (after incentive)

4.43 months
simple payback

Space Center Self Storage, located on Highway 71 in Mena, Arkansas, is a small business with big lighting needs. The 305 on-site storage units range in size from 5' x 10' up to 10' x 40', all of which need to remain safely lit for customers. Working with SWEPCO and their incentives, Space Center Self Storage was able to retrofit their lighting system for significant cost savings.

During 2015, owner Loren Whisenhunt participated in SWEPCO's Small Business Energy Efficiency Program to complete a lighting retrofit consisting of changing linear fluorescent office space lighting to linear LED tubes, exterior dusk-till-dawn LED fixtures, and over 250 incandescent bulbs to LED screw-in lamps. With 24-hour access, Space Center prides itself on security. Now with more efficient lighting, Space Center is saving energy, spending less on utilities and providing a safe and secure storage facility for their customers.

As a result of the replacements, Space Center Self Storage improved the energy efficiency of their facility for a savings of 104,447 kilowatt-hours per year for an estimated financial savings of $10,444 annually. Thanks to these electricity cost savings and a $16,711 incentive from SWEPCO, the retrofit will pay for itself in less than 5 months.

For more program information, call **888-266-3130** or visit **SWEPCOgridSMART.com** today.

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Utilities' Programs Offer Businesses Incentives for Saving Energy

by **Jan Cottingham**
Posted 11/2/2015 12:00 am

Energy is money, and businesses in Arkansas are saving both by taking advantage of energy-efficiency programs sponsored by the state's electric and gas utility companies.

The savings go beyond individual companies, a representative of Entergy Arkansas Inc. said. Ratepayers and the utilities themselves benefit.

The programs trace their origin to 2007, when the Arkansas Public Service Commission approved rules for conservation and energy-efficiency programs to be operated by the utilities the PSC oversees. In addition to Entergy, these include Arkansas Oklahoma Gas Corp., CenterPoint Energy, Empire, Oklahoma Gas & Electric, Source Gas and Swepco.

Under PSC rules, the utilities are responsible for the administration and implementation of the programs in their service areas. In addition, the PSC must approve the utilities' energy-efficiency programs, and the utilities must include programs for all customer classes, including residential, small business, industrial, municipal and agricultural customers.

The programs vary but generally they include financial incentives for improvements like fluorescent and LED lighting upgrades, lighting controls, air compressor system upgrades and HVAC upgrades and tune-ups.

The programs are funded with an "energy-efficiency cost rider" paid by all ratepayers.

Buddy Hain, president of energy contractor LSCO of North Little Rock, called it "found money" and lamented that more businesses aren't taking advantage of the programs. Of course, as Hain readily acknowledged, his company is benefiting from the programs. Currently, he said, 100 percent of LSCO's business lies in making buildings more energy efficient through the installation of LED lighting.

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LSCO is a "trade ally" for Entergy Solutions, the energy-efficiency program of Entergy. That means the company, a licensed electrical contractor, is authorized to implement efficiency initiatives.

LSCO has performed energy upgrades for a number of cities in the state, including Stuttgart, DeWitt and Dumas, removing incandescent and fluorescent lighting in city halls, fire stations, libraries and senior centers and installing LED lighting.

"You can take out a 60-watt incandescent bulb and put in an 8-watt LED bulb and you're getting the same light output, so you're saving 52 watts," he said.

Hain has done the same thing for grocery stores, schools, office buildings and real estate companies — "anyone who has a bunch of light fixtures."

Entergy's website presents the city of Berryville as a case study in its CitySmart Program, which recommended the city upgrade the interior lighting in several of its municipal buildings. Berryville got a cash incentive of more than $4,000 from Entergy, reduced its annual energy consumption by 41,536 kilowatt-hours and reduced its annual energy costs by $3,322, the utility said.

Alan Freeland, director of technical services for Schulze & Burch Biscuit Co. of Searcy, praised the Entergy Solutions program.

During the last three years, Schulze & Burch, working with CLEAResult, an environmental consultant that is Entergy's implementing contractor, has replaced air compressors, installed energy-efficient lighting and motion sensors and even built insulated walls to improve the efficiency of the facility's air-conditioning system.

Schulze & Burch has spent $589,000 and received incentives totaling $401,000, he said. On top of that, the manufacturer is saving $5,000 to $7,000 on its monthly energy bills.

Georgia-Pacific in Crossett is among Entergy's case studies in its Large Commercial & Industrial Program. "In 2012, Entergy Arkansas representatives began working with the Crossett facility to determine how energy efficiency could be improved on

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site with a focus on lighting, compressed air, pumps and other large motors used in the manufacturing process," the company said.

The improvements resulted in annual energy savings of $978,324 and were expected to pay for themselves in about a year.

Erin Kiefer is director of special projects for Assembled Products Corp. of Rogers, a manufacturer of electric shopping carts for the mobility impaired and commercial pressure-washing equipment, among other products.

Swepco, working with CLEAResult and Graybar, a distributor of industrial and electrical supplies, upgraded the lighting in most of Assembled Products' facilities, Kiefer said. The project cost the company $33,000, but it received a rebate of more than $24,000. It's experiencing a 5 percent energy savings year over year, Kiefer said.

Swepco's program for small businesses — those with a peak demand less than or equal to 50 kilowatt-hours — allows them to save without any upfront costs, offering things like free installation of low-flow faucet aerators.

PSC Mandate

The PSC mandates that any energy-efficiency actions taken by a utility must assist all ratepayers, said Gabe Munoz, commercial and industrial energy efficiency program manager at Entergy.

"The idea is that the cheapest power plant that Entergy or any investor-owned utility builds is the one they don't have to build," Munoz said. "Every time a generation facility is built, the ratepayers pay for it. And so if we don't have to build a plant, the ratepayers don't have to assume that cost."

Entergy seeks to foster energy efficiency through long-term energy savings along with reducing peak demand, "when we manage the amount of electricity that's on the grid during our peak season," Munoz said. And the peak season in Arkansas is always summer.

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As part of reducing demand, Entergy offers to farmers the Agricultural Irrigation Load Control Program, which allows them to save an average of $100 per irrigation pump on Entergy Arkansas metered well pump accounts. Entergy installs control hardware on the pumps and the customer allows the utility to power off their participating wells during the peak demand months of June through August.

"These interruptions are restricted to weekdays, for up to four hours," the company says. "Typically, power-offs happen much less frequently. In 2014, interruptions occurred on only one day of the entire summer, and only seven days of the year before."

So far this year, about 2,000 small businesses have participated in Entergy Arkansas' energy-efficiency programs, he said.

"Next year's budget is going to be about $65 million," Munoz said. "The $65 million is the entire budget for all our programs, and the majority of that is incentives going back to the customers."

These energy-efficiency programs "last as long as they're approved by the commission," Munoz said. So far, Entergy has approval for its programs through 2016, but is waiting for PSC guidance on its programs for 2017-18.

Buddy Hain, the North Little Rock lighting contractor, is sold on the energy-efficiency programs and thinks others should be too.

"I was speaking at the Stuttgart Chamber of Commerce and this one guy — he was sitting in the front row and I could tell he wasn't buying it. And I said, 'You don't believe this, do you?' and he said, 'No. Why would the utility company pay me to reduce what they're trying to sell me?' And I said, 'No. 1, they're mandated by the Public Service Commission to do this. No. 2, you're being charged for it. Look on your bill. There's an energy program charge.

"'But giving away this money, it decreases the load off the grid, and it's cheaper than building power plants and transmission lines and transformers. And it's the right thing to do. It's obviously great for the environment because we're reducing load so much.'"

AEP SOUTHWESTERN ELECTRIC POWER COMPANY
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Join us for an exclusive contractor appreciation event!

SWEPCO Arkansas Residential and Commercial Contractors

Thursday, December 3
11:30 a.m.–1:00 p.m.

324 Ballroom/Jose's
324 W. Dickson Street
Fayetteville, AR 72701

Free Parking

You are an important member of the SWEPCO Arkansas Contractor Network. Thank you for being a part of our winning team and making 2015 so successful.

To show our appreciation, lunch is on us! We will also be giving away a few prizes, so don't miss your chance to win.

RSVP by November 25 to Beth Spencer beth.spencer@clearesult.com or call 479-935-4953

AEP SOUTHWESTERN ELECTRIC POWER COMPANY
A unit of American Electric Power

Join us for an exclusive contractor appreciation event!

SWEPCO Arkansas Residential and Commercial Contractors

Tuesday, December 1
11:30 a.m.–1:00 p.m.

Silver Star Smokehouse
5205 W. Park Blvd.
Texarkana, TX 75503

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SWEPCO Energy Efficiency Programs

Event details

Date:
Thursday, Oct. 1

Time:
11:30 AM-1:00 PM

Location:
Ouachita Center at the Rich Mountain Community College
1100 College Drive
Mena, AR 71953

Register now

Lunch provided!
Email beth.spencer@clearesult, or call 479-935-4953 to RSVP.

Join us for lunch!

SWEPCO has financial incentives available to help you save money and energy on home and business improvements. Join us for a community ally lunch to find out more.

This community meeting will provide an overview on how to participate in SWEPCO's residential, small business, and commercial & industrial energy efficiency programs. To learn more about SWEPCO's incentive programs, visit SWEPCOgridSMART.com.

Join us for a great lunch, hear stories of energy efficiency success from local businesses, and enter to win door prizes.

RSVP by Thursday, September 24.

Feel free to include guests on your RSVP.

gridSMART®
From Southwestern Electric Power Company

Texarkana Community Ally Lunch & Learn Invitation

AEP SOUTHWESTERN ELECTRIC POWER COMPANY
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SWEPCO Energy Efficiency Programs

Event details

Date:
Thursday, Oct. 22

Time:
11:30 AM-1:00 PM

Location:
Holiday Inn – Arkansas Convention Center
5200 Convention Parkway
Texarkana, AR 71854

Register now

Lunch provided!
Email beth.spencer@clearesult, or call 479-935-4953 to RSVP.

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SWEPCO has financial incentives available to help you save money and energy on home and business improvements. Join us for a community ally lunch to find out more.

This community meeting will provide an overview on how to participate in SWEPCO's residential, small business, and commercial & industrial energy efficiency programs. To learn more about SWEPCO's incentive programs, visit SWEPCOgridSMART.com.

Join us for a great lunch, hear stories of energy efficiency success from local businesses, and enter to win door prizes.

RSVP by Friday, October 16

Feel free to include guests on your RSVP.

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